THE GREAT SLEET STORM.

MISSOURI BOTANICAL GARDEN.

TWELFTH ANNUAL REPORT.

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1901.

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A. D. GUNNINGHAM, Secretary.

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* *Ex officio.*

[1] Elected President of the Board of Public Schools of St. Louis, October 9, 1900, to succeed C. M. Woodward, who had held that office for one year.

[2] Elected Mayor of the City of St. Louis, April 2, 1901, to succeed Henry Ziegenhein, who was elected to that office April 6, 1897.

Ref. 580.7

PREFACE.

Under direction of the Board of Trustees, the twelfth annual report of the Missouri Botanical Garden is presented to the public.

The eleventh report was issued February 3, 1900. Separates from the present volume were issued on the dates noted: Von Schrenk, A disease of the black locust, February 10, 1901; Ferguson, Crotons of the United States, February 16, 1901; Toumey, An undescribed Agave from Arizona, April 6, 1901; Trelease, A cristate Pellaea, April 6, 1901; Trelease, A Pacific-slope palmetto, April 16, 1901.

These reports are sent to scientific institutions and journals, in exchange for publications and specimens desirable for the library, herbarium or collection of living plants of the Garden, and, when possible, reprints of the botanical articles they contain are presented to botanists occupied with a study of the subjects these refer to. Any of the Garden publications not out of print may be purchased at approximately the cost of publication from A. I. Eriksson, Tufts College, Mass.; R. Friedländer & Sohn, Berlin, Germany; W. Wesley & Son, London, England; or the undersigned.

WILLIAM TRELEASE.

ST. LOUIS, MO., May 10, 1901.

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A WINTER SCENE.

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REPORTS FOR THE YEAR 1900.

REPORT OF THE OFFICERS OF THE BOARD.

SUBMITTED TO THE TRUSTEES JANUARY 9, 1901.

To the Board of Trustees of the Missouri Botanical Garden:

The financial results for the year ending December 31, 1900, herewith presented, are not entirely satisfactory, in that the receipts from rentals show a considerable falling off from those of the preceding year and are much less than we anticipated.

This decrease is easily explained and is attributable almost entirely to the vacancy of one of the largest and most valuable pieces of our business properties, the result of the failure of the tenant in January last, and a vacancy since March 1st, causing a loss in rentals for the year of about $7,000.00; but we hope with improved business conditions, to find a satisfactory tenant during the spring.

With the above exception we are glad to report fewer vacancies than at any time during the past few years, and a slight improvement in rental values.

There seems to be no demand for high class residence property in the district near the Garden and none of the property offered for sale by the Board has been disposed of.

The extension of the Garden by the addition of about 20 acres, mentioned in our last report, has been made, and the tract has been graded, partially planted with trees and shrubs, and sown to grass, at a cost of $12,317.59, and the plant house system has been still further extended by the erection of a plant house similar to the one erected a few years ago, at a cost of $5,110.90.

Additions have been made to the already large botanical library and herbarium and the following amounts have been credited to the Stock Account, which now amounts to $1,582,110.64.

Library	$4,641 19	
Herbarium	1,262 25	$5,903 44

Mr. Shaw's bequests have all been carried out as provided for in his will, the buildings of the trust kept in good repair and insured, and all taxes and demands against the trust have been paid, but by reason of the large expenditure for Garden improvements, we have been compelled to encroach upon our surplus to the extent of $12,111.52, which surplus was created for the extension and improvement of the Garden.

RECEIPTS.

Rents	$91,804 72	
Interest and dividends	2,032 10	
Garden pasturage and sales	701 58	
Garden handbook sales	41 00	
Publication sales	26 76	
Loss by fire to buildings	738 50	$95,344 66
Cash on hand January 1, 1900		14,646 55
		$109,991 21

EXPENDITURES.

Garden Account,		
Labor pay-roll	$13,322 80	
Students' pay-roll	1,514 70	
Office assistance	780 00	
Fuel	1,055 51	
Water	400 00	
Repairs and supplies	2,518 90	
Stable and implements	605 66	
Plants and seeds	1,017 84	21,215 41
Herbarium Account,		
Office assistance	435 00	
Fuel	61 59	
Current expenditure	762 61	1,259 20
Library Account,		
Office assistance	1,113 24	
Fuel	61 58	
Current expenditure and books	4,053 93	5,228 75
Carried forward		$27,703 36

Brought forward		$27,703 36
Office Account,		
Salaries	4,602 00	
Fuel	61 63	
Current expenditure	330 32	4,993 95
Research Account,		
Salaries	819 96	
Drawing plates	5 00	
Current expenditure	385 89	1,210 85
Scholarship Account,		
Instruction	663 00	
Care of Lodge	240 00	
Current expenditure	111 47	
Fuel	37 93	1,052 40
Total current Garden expenses		$34,960 56
Garden Improvements,		
Plant house	5,110 90	
Grading, planting and fencing garden extension	12,317 59	17,428 49
Total amount expended on Garden		$52,389 05
Publication Account,		
Annual volume		1,238 25
Property Expenses,		
State, school and city taxes	29,478 22	
Streets, sidewalks and sewers	513 26	
Insurance	5,962 48	
Repairs	6,159 39	
New improvements	430 00	42,543 35
Office Expenses,		
Salaries	3,600 00	
Office rent	780 00	
Printing, postage, telephone and advertising .	1,244 45	5,624 45
Bequests,		
Flower Show	465 00	
Flower Sermon	200 00	
Trustees' Banquet	1,096 45	
Gardeners' Banquet	431 96	
Washington University, School of Botany .	1,220 77	3,414 18
Sundries,		
Legal expenses	114 00	
Repairs to buildings damaged by fire . . .	738 50	
Real estate, purchase of leasehold	600 00	1,452 50
Total expenditure		$106,661 78
Cash on hand December 31, 1900		3,329 43
		$109,991 21

The books of the Board have been closed after showing the operations for the year ending December 31, 1900, and the receipts have been disposed of as follows: —

Rent Account	$91,804 72	
Interest and dividends	2,032 10	
Garden Handbook	41 00	$93,877 82

CONTRA.

Garden Expenses	$34,258 98	
Garden Improvements	17,428 49	
Repairs	6,159 39	
Office Expenses	5,624 45	
New Improvements	430 00	
Insurance	5,962 48	
Washington University School of Botany	1,220 77	
Flower Sermon	200 00	
Flower Show and unexpended balances	800 00	
Trustees' Banquet, unexpended balances	1,971 20	
Gardeners' Banquet, unexpended balances	744 37	
Publication Account	1,211 49	
Legal Expenses	114 00	
Streets, sidewalks and sewers	385 50	
	$76,511 12	
Taxes	29,478 22	
	$105,989 34	
Deficit		12,111 52
	$105,989 34	$105,989 34
Surplus to December 31, 1899		$105,470 20
Less Deficit for 1900		12,111 52
Surplus December 31, 1900		$93,358 68

Respectfully submitted,

R. J. LACKLAND, President.

Attest:

A. D. CUNNINGHAM, Secretary.

TWELFTH ANNUAL REPORT OF THE DIRECTOR.

SUBMITTED TO THE TRUSTEES JANUARY 9, 1901.

To the Board of Trustees of the Missouri Botanical Garden:

The following report on the Missouri Botanical Garden and the Henry Shaw School of Botany is respectfully submitted in compliance with your rules.

THE BOTANICAL GARDEN.

In its essential features, the Garden has been maintained through the past year on about the same lines as for some years preceding, the principal differences in treatment being close to the main entrance, where, instead of the rather numerous small beds that have usually been devoted first to bulbs and later to cacti, etc., a heavy mass of Crotons was this year disposed on either side of the walk leading in from the main gate, these being replaced in autumn by bulbs for early spring flowering.

Though the revenue of the Board has not yet been increased through sales of real estate ultimately made possible by the Court decree noted in my last report,* the power to make such sales when necessary and desirable, now makes it possible to spend on the Garden the entire current revenue, as intended by its founder, and as a result the extensions which have been contemplated for some years past have now been begun, essentially on the lines indicated at length in my eighth report.†

The improvements made this year consist in the grading of some twenty acres of land lying on Alfred, Magnolia and Tower Grove avenues, and in planting the blocking-out border about this tract, on plans prepared some years

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* Report. **11**: 13.

† Report. **8**: 37.

since by Messrs. Olmsted, Olmsted and Eliot. In the grading, which involved the moving of 48,878 cubic yards of earth, two rather large ponds, connected by a meandering brook, were made, and the ground was given an easy, somewhat undulating and varied fall from the streets to these bodies of water. Along the streets, the border, averaging about 55 feet in width, has been planted closely so as to secure immediate effect, but necessitating subsequent thinning, with a skilfully arranged mixture of 30 species of trees and 100 species of shrubs (to which 8 additional species of shrubs remain to be added). Well grown nursery stock of good size was selected, so that even in the first year it is believed that the masses of foliage will be striking and attractive, while they will increase in effectiveness and beauty each year as the trees grow.

All of the material used in this border plantation is representative of North American plants, and it is proposed as rapidly as the funds at the disposal of the Board permit, to provide suitable drainage and water supply for the recently graded tract, on which will then be planted, in accordance with the plans of the landscape architects above named, a collection of 181 arborescent, 269 fruticose, and some 1,400 herbaceous species, representative of the North American flora, and arranged essentially in the familiar sequence of families of the "Genera Plantarum" of Bentham and Hooker.* The woody plants needed for this synopsis, to the extent of 139 trees and 204 shrubs, are already in the nursery. Before the tract is opened to the general public, the unplanted areas will be converted into lawn, and the whole will be provided with suitably arranged paths, — a result that will probably be achieved within five years, by which time the trees and shrubs are expected to have reached a sufficient size to make this one of the most beautiful parts of the entire Garden.

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* Report. 8 : 38.

AMONG THE ALOES.

Including the border of the newly graded addition, and the woody plants destined for the North American synopsis but yet in nursery, the Garden now contains 9,194 species and varieties of plants (including annuals which were cultivated in their season and are likely to be cultivated or replaced by others another spring), of which 5,547 are annuals or hardy perennials, and 3,647 are cultivated under glass. As compared with 1899, this shows a net increase of 67 species.* The plants added in 1900 consist of 344 entries, of which 69, including 11,545 plants or packets of seeds and valued at $808.85, were collected or propagated by Garden employees; 178, consisting of 4,001 plants or seed-packets and valued at $635.95, were presented, mainly in exchange for similar material or, chiefly, for the publications of the Garden; and 94, including 26,829 plants or packets of seeds, were bought, the expenditure for plants and seeds through the year, as shown by the Secretary's books, amounting to $3,254.39 (of which sum $2,236.55 was for the planting of the border). By way of exchange, 239 packets of seeds and 267 plants, appraised at $46.85, were distributed to correspondents of the Garden; and 2,416 surplus plants and a few packets of seeds were presented to schools and charities, in continuation of the policy inaugurated some years since.†

A further extension of the plant houses begun in 1894‡ and enlarged in 1897, has now been made by the erection of a tower at the northwestern corner of the system, similar to that built at the northeastern angle in 1897, and connected with the houses already standing and extended southwardly by wings of similar design to those previously built, but of steel construction. In these additions, small but representative collections of succulents and of Acacias and

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* Report. **11**: 13.

† Report. **10**: 15. **11**: 13.

‡ Report. **6**: 14. **8**: 41. **9**: 14. **10**: 13.

Acacia-like plants have been planted out in a natural manner, and it is expected that far better specimen plants representing these groups will thus be grown than has been possible while they were cultivated in pots and tubs. The quadrangle inclosed by this range of houses and the old main greenhouse with its Agave wing, now devoted to temporary potting and other work sheds, frames, and propagating houses, will, it is hoped, be renovated in the course of the next year or two, the old flue-heated propagating houses being then removed and replaced by a system of houses of modern plan and construction, heated by hot water from the boilers which now heat the new range and the *Victoria* pond.

The records of the Gate-keeper show that in 1900, 42,483 persons visited the Garden on week-days, 6,911 on the open Sunday in June, and 14,488 on the open Sunday in September, — making a total of 63,882 for the year. Though considerably smaller than the number for the previous year (71,021), this total is unexpectedly large when it is recalled that for eight weeks following May 8th, in the most attractive season of the year, the entire city was almost paralyzed by a car strike which, though it did not stop the car service, effectually prevented the use of the cars on many lines except when such use was imperatively necessary, while, for the two months following, a nominal continuation of the strike greatly interfered with the use of the cars.

The practice of securing the more important current collections for the herbarium has been continued through the year just ended, and a number of special collections of considerable size have been purchased or secured by exchange. The material incorporated in the herbarium during the year comprises 8,415 sheets of specimens, of which 3,649 were bought, 11 pertain to the Redfield collection, 3,002, appraised at $150.10, were presented or obtained in exchange for duplicates or for the publications

of the Garden, and 1,753 were collected by employees of the institution. The Secretary's books show an expenditure of $762.61 for herbarium supplies and purchases. By way of exchange, 115 herbarium specimens, valued at $5.75, were distributed to correspondents, and 33 fragments, without nominal value, were sent to specialists for research purposes.

The present composition of the herbarium is as follows: —

Engelmann Herbarium (all groups) about		97,800 specimens.	
The General Herbarium: —			
Higher plants.			
The J. J. Bernhardi Herbarium . .	61,121		
The J. H. Redfield Herbarium .	16,447		
Other specimens	150,456		
		228,024	"
Thallophytes.			
The J. J. Bernhardi Herbarium * .	126		
Other specimens	22,815		
		22,941	"
Making a total of about		348,765	"
Valued at			$52,314 75†

The following, practically a part of the herbarium facilities, are the same as last year: ‡ —

Wood specimens of various sizes	1,027,	valued at	$100 00
Wood veneers, by Spurr, Hough, Nördlinger, and Michel	2,279	" "	160 00
Microscope slides, by Hough, Penhallow, Munroe, and others	1,051	" "	250 00
Together	4,357	" "	$510 00

* So far as yet incorporated.

† The valuation of such collections is purely arbitrary, since they could not be exactly replaced for any amount of money, in case of loss; but they are appraised at $15.00 per hundred mounted sheets. — Report. **10**: 18.

‡ Report. **11**: 16.

The additions to the library in 1900 include 573 books and 31 pamphlets purchased, and 311 books and 456 pamphlets, valued at $577.97, presented or sent in exchange for Garden publications. The Secretary's books show that during the year $4,009.54 was spent for additions to the library and for binding and pamphlet covers.

The card index has been enlarged by the incorporation of 5,368 new cards, of which 2,068 were bought, and 3,300 were written by employees of the institution.

As now constituted the library contains: —

Pamphlets	19,662			
Books (general)	14,642			
	34,304	valued at		$53,618 18
Books (Sturtevant Prelinnean Library)*	463	"	"	2,315 00
Manuscript volumes (Shaw, Engelmann and Roetter)	66	"	"	800 00
Total	34,833	"	"	$56,733 18
Index cards.				
Various	206,815			
Sturtevant Index	52,300			
Total	259,115	"	"	2,591 15
Total valuation				$59,324 33

The manuscript catalogue of the library, to which reference has been made in previous reports,† has been increased by "copy" cards for the books and pamphlets incorporated during the year, but its publication is not yet considered expedient.

Of the small handbook on sale at the gate, 163 copies were sold in 1900, and 3 copies were given away.

* The original number and arbitrary valuation of the collection presented by Dr. Sturtevant. (Report. 8: 21). On the Prelinnean shelves are now found a larger number of volumes than is indicated here, the accession and valuation of these, however, from year to year being included in the general accession lists and the valuation of the library as a whole.

† Report. 9: 16. 10: 21. 11: 17.

TILLANDSIA BULBOSA PICTA.

The library exchange list has been considerably increased, so that at present 1,093 serial publications are received, of which 84 are purchased, and 1009, issued by 770 institutions, are presented.*

Visiting botanists, as in previous years, have made use of the facilities for investigation afforded by the Garden, which have also been made available to correspondents as far as practicable, and one candidate for the Master's degree in Washington University has spent a part of the year in resident graduate work.

The office staff has remained the same as in 1899, except that Mr. Jesse B. Norton resigned his position in the library in February, his place being taken by Miss Ida L. Norton. Approximately the same percentage of their time as in preceding years has been given by the Horticultural and Botanical Assistants to research work, some of the results of which are now ready for publication and will shortly appear in the Reports of the Garden or other suitable places. In the course of a hasty visit to Northern Mexico in March, I became sufficiently interested in several undescribed or imperfectly known Yuccas and Agaves and related plants to revisit Mexico twice later in the season, and the results of my study of these plants, which were presented in abstract before the Botanical Society of America in June, will be published from the Garden in the near future.

The instruction of Garden pupils, provided for in Mr. Shaw's will, has been carried on during the year on the lines noted in earlier reports. Two pupils, Charles Deusner and Cornelius Winther, having completed the prescribed course, were granted certificates in March, after examination by the Garden Committee. The vacancies so created were filled by the appointment of Charles W. Fullgraf, of St. Louis, and Oliver P. Marker, of Evansville, Ind.; and John H. Tull, of Morganton, N. C., was admitted in April

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* Report. **10**: 25, 91. **11**: 17.

as a paying pupil, under the provisions made by the Board some years since.

Four annual events provided for in the will of the founder of the Garden, have taken place, as follows: The preaching of a sermon on the wisdom and goodness of God, as shown in the growth of flowers, fruits and other products of the vegetable kingdom; the eleventh banquet to the Trustees of the Garden and their invited guests; the eleventh banquet to the gardeners of the institution, and invited florists, nurserymen and market gardeners, and the award of premiums and prizes at a flower show held in St. Louis.

The flower sermon was preached in Christ Church Cathedral, St. Louis, on the morning of May 13, by Rt. Reverend Alexander C. Garrett, D.D., of Dallas, Texas.

The Trustees' banquet was given at the Southern Hotel, on the evening of March 31st. Covers were laid for 145 persons, among whom, in addition to the Trustees of the Garden, representative citizens of St. Louis and several distinguished investigators in botany and related sciences, were the officers and members of the North Central Association of Colleges and Secondary Schools, then meeting in the city.

Mr. Henry Hitchcock, Vice-President of the Board, presided, and speeches or addresses, suitable to the occasion, were made by Dr. L. O. Howard, Entomologist of the United States Department of Agriculture, President William F. Slocum, of Colorado College, President Charles F. Thwing, of Western Reserve University, Professor L. H. Bailey, of Cornell University, Professor J. B. Johnson, of the University of Wisconsin, and Rev. Dr. I. S. Hopkins, of St. Louis.

The banquet to gardeners, nurserymen and florists was given at the Mercantile Club on the evening of November 3d. Covers were laid for 110 persons, among whom were the gardeners and office staff of the Garden, repre-

A GROUP OF IRIS.

sentative florists, nurserymen and market gardeners of the vicinity, and officers and representatives of several state and national horticultural organizations.

The Director of the Garden presided, in accordance with the directions of Mr. Shaw's will. Speeches appropriate to the occasion were made by President-elect Patrick O'Mara, of the Society of American Florists, Mr. Jared G. Smith, in charge of the work of plant and seed introduction of the United States Department of Agriculture, Mr. J. J. Beneke, in charge of the Chrysanthemum Exhibition of the St. Louis Florists' Club, William Scott, in charge of floriculture at the Buffalo Pan-American Exposition, Mr. A. T. Nelson, of the Missouri Horticultural Society, and Hon. D. R. Francis and Mr. Julius C. Birge, of St. Louis.

As in previous years, the award of premiums for flowers and plants was intrusted to the St. Louis Florists' Club, on the occasion of its Chrysanthemum Exhibition, held in the Exposition Building, November 14th to 16th, inclusive.

THE SCHOOL OF BOTANY.

The undergraduate work of the Henry Shaw School of Botany followed essentially the lines in 1900 that have been detailed in earlier reports.* Seventeen electives in botany are offered, covering the subject in a symmetrical way, as to its essentials, and constituting the equivalent of about three full years' work, preparatory to the performance of thesis work in some special subject. The electives offered in the last University Catalogue are as follows: —

1. Elementary Morphology and Organography, with reference to Ecology and Systematic Botany. Lectures and demonstrations.
2. Elementary Anatomy and Phanerogamic Botany. Laboratory work.
3. Synoptical study of the Cryptogams. Laboratory work.
4. A special laboratory study of some group of Cryptogams.
5. Methods of Vegetable Histology. Laboratory work.
6. Histology and Morphology of the Higher Plants. Laboratory work.

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* Report. **10**: 33.

7. A laboratory study of the minute anatomy of the lower Cryptogams.
8. Technical Microscopy of Timbers. Laboratory work. *Two hours a week.*
9. Economic Botany. Lectures and laboratory demonstrations.
10–11. Applied Mycology. Laboratory work.
12–13. Garden Botany. Laboratory study of cultivated plants, at the Botanical Garden.
14–15. Vegetable Physiology. Laboratory work.
16–17. Bacteriological Technique. Laboratory work.

Graduate work, for students grounded in the elements of botany, is provided either at the University laboratories, where the principal instrumental equipment is kept, or at the Garden, according to the nature of the subject elected. During a part of the year just closed, one candidate for the Master's degree has been pursuing a course of this kind.

The instructional force of the School of Botany remains as at the beginning of the year.

Very respectfully,

WILLIAM TRELEASE,
Director.

SCIENTIFIC PAPERS.

A DISEASE OF THE BLACK LOCUST (ROBINIA PSEUDACACIA, L.).

BY HERMANN VON SCHRENK.

The black locust, *Robinia Pseudacacia*, is a tree grown extensively in this country and in Europe, as an ornamental tree, and in some sections for its wood, which ranks among the best known and valuable of the American timbers. It is a tree which has few enemies, but of the small number which do attack it several are very destructive. Of the insect enemies, the locust borer, *Cyllene robiniae*, Forster, is the most destructive.* It is responsible for the fact that the locust is not more universally grown for its wood, for it bores into the sound wood of living trees, completely riddling it with holes which spoil the wood for lumber.

The fungus diseases of the locust are, as a rule, not very destructive. *Aglaospora profusa* De Not., *Valsa ceratophora* Tul.† and several others are found on the twigs now and then. The wood of the trunk and branches is destroyed by *Polyporus rimosus*, Berk. This fungus grows on older trees in the eastern United States; it has been found from New York southward along the Alleghanies to Alabama and westward to Southeast Missouri. During the last year it was found in great numbers on the

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* Jack, J. G. Notes on two troublesome borers. Garden & Forest. **5**: 426. 1892.

Packard, A. S. Insects injurious to forest and shade trees. Bull. No. 7, U. S. Entomological Commission. 95. 1881.

† Sargent, C. S. Silva of North America. **3**: 38. 1892.

southern shore of Long Island, N. Y., where it destroyed the wood of many of the fine old trees, which form one of the attractive features of the boulevards.* Every severe windstorm breaks off some of the large branches of affected trees, and oftentimes the entire crown, so that the whole tree must be removed.

Polyporus rimosus attacks the locust after the trees have formed some heartwood in the larger branches, *i. e.* when the trees are about six inches in diameter. From this time on one will find the mycelium of the fungus growing in the heartwood, and with increasing frequency as the trees grow older. Infection takes place through older branches, and through the tunnels made by the locust borer. Wounds are frequent in older trees because of the extremely brittle nature of the branches. The fresh wounds are favorable points for the germination of the spores, and it is an easy matter to find all stages, from trees recently infected, to trees where the whole side of a trunk has evidently been infected from one branch.

The wood of the locust is very hard and resistant, and has been used for many years to such an extent that it ranks among the most valuable timbers. The following description of the wood is given by Sargent:† "The wood is heavy, exceedingly hard and strong, close grained and very durable in contact with the ground. It is brown or more rarely light green with pale yellow sapwood composed of two or three layers of annual growth only; . . . The specific gravity of the absolutely dry wood is 0.7333, a cubic foot weighing 45.70 pounds."

Several rows of very large ducts mark the beginning of the spring wood. These ducts are remarkable for the large number of thylloses which completely fill the lumen; this feature distinguishes the wood from that of the closely

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* The writer is indebted to Mr. A. Wagstaff of Babylon, L. I., for permission to cut an affected tree on his grounds.

† Sargent, C. S. Silva of North America. **3**: 40. 1892.

allied honey locust (*Gleditschia triacanthos*). Between the ducts the thick-walled short wood fibres are massed closely together with here and there a group of wood parenchyma cells. The medullary rays are numerous, and many extend continuously out to the sapwood. They are rather obscure when viewed with the naked eye.

The changes which the mycelium of *Polyporus rimosus* brings about in the locust wood are very striking. The hard resistant wood is transformed into a soft yellow mass which, when wet, is more or less spongy. The almost flint-like character of the sound wood is wholly gone in completely decayed wood, which can be cut almost like cheese. On Plate 1 a cross-section of a locust trunk is shown in which parts of the heartwood are destroyed. The tree from which this section was taken measured 9 inches in diameter at this point. A sporophore grew 20 feet from the ground, and the decay extended up the trunk from this point for 3 feet, and down the trunk 8 feet 5 inches. It will be noted that the central part of the heartwood is completely rotted, and that the decay extends outward in radial lines. When split longitudinally it will be seen that these radial lines form the edges of sheets of decayed wood which are from 1 to 2 inches in width vertically; they occur every few inches in the vertical section, and extend out from the central decayed mass toward the bark, which they reach in many cases. Every one of these sheets of decayed wood has a more or less distinct red core almost the size of a small lead pencil, composed of wholly disintegrated wood held together by the mycelium of the fungus; the whole core can be lifted out intact. Extending upward and downward from this core the yellowish-brown wood is discolored, becoming yellow orange * nearest the core and very light straw color farther away. As the cores grow outward, the hyphae composing them grow through the

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* See yellow orange shade No. 1, Milton Bradley color scale.

cambium layer and the living bark, killing them both. A large mass of hyphae forming a compact red brown felt then develops in the space left when the live surrounding wood increases outward. Such a space, filled with the brown felt, can be seen near the upper end of the figure on Plate 1, immediately under the bark.

On a tangential section of a diseased trunk the decayed sheets stand out as lens-shaped masses, the round core in the centre surrounded by yellow wood gradually merging into the yellow-brown of the heartwood. The lens-shaped areas are of all sizes from 2 inches high and $\frac{1}{2}$ inch broad to the size of a pinhead, which can be recognized only by their differing in color from the surrounding wood. These sheets of decayed wood grow in height, and in the course of time join in a vertical direction; new sheets form between the primary ones, and ultimately a tangential union takes place. The whole wood is then completely decayed.

The sheets do not begin to form until a part of the heartwood is decayed. In an endeavor to explain this rather singular method of spread through the wood, one would at first sight suppose that the core of each sheet had taken the place of the remnant of a small branch, which had been healed over as the tree grew in diameter. This seems very plausible from the fact that the decay extends so rapidly in what appears to be a predetermined path, *i. e.*, a path extending through the sound wood on either side, through which the fungus hyphae can grow more readily than through the sound wood. It was found that this could not be the case, because there are not enough small branches in the sound wood to account for the many radial lines along which the fungus traveled. In seeking for another explanation it was found that the medullary rays are probably the paths selected in this case, as in so many other trees.

The manner in which fungus hyphae spread through a piece of timber is determined to some extent by the struc-

ture of the timber. Wood which has large vessels, prominent medullary rays, resin channels, or the wood elements of which are large-lumened and thin-walled, will be penetrated throughout its entire mass more readily than wood where those natural channels are absent, or which has short thick-walled wood elements. As a rule it was found that the course of hyphae in all the timber so far examined is first through the medullary rays and vessels, from which points individual hyphae penetrate the woodcells adjoining; in other words it appears that growth directly through a solid mass of wood rarely takes place, and when it does so it is a very slow process.

The wood elements of the locust are short, thick-walled and resistant, and are penetrated by the hyphae very slowly. The medullary rays on the other hand are large and continuous, and are composed of small comparatively thin-walled parenchymatous cells. These are rapidly invaded and destroyed by the hyphae, and it is through them that the mycelium extends outward from the point of infection. This accounts for the peculiar sheets. The fungus advances through the large medullary rays, and from them the hyphae grow laterally and vertically into the surrounding vessels and wood cells. Progress laterally is made difficult, because the hyphae have to bore their way through the solid walls of the wood fibres and it, therefore, goes on slowly. Progress longitudinally is more rapid, because here the large ducts permit of a rapid advance up and down, and even the woodcells are more easily reached. It will readily be comprehended how a spread of this kind through wood of the nature of the locust must tend to form sheets of the kind described. One finds similar cases among some of the oaks, but not to such a marked extent, for there the woodcells are not so resistant nor so closely packed together.

A piece of wood taken from the vicinity of one of the sheets will show changes as represented in Plate 3. The

medullary rays when invaded by the mycelium are rapidly destroyed. They can be recognized as brown lines extending outward into the sound wood (Plate 3, m). The large conspicuous vessels are completely filled with brown hyphae, which have riddled the walls of the thylloses, but have not entirely absorbed them. Passing toward the more decayed parts one finds the small woodcells attacked, here and there, so that small groups lie embedded in a felt of hyphae. Even these gradually disappear (see the middle of Plate 3) and one has only remnants of the large ducts. The walls of the latter appear to be the most resistant parts of the wood, and even in completely decayed wood, such as is represented at the top of Plate 3, one can always recognize the place of the former ducts by separate pieces which the fungus has not been able to destroy. The walls of the thylloses are similarly resistant, and can be recognized, together with the walls of the ducts (Plate 3). Both stain deep red with phloroglucin and hydrochloric acid, showing that they have suffered no change whatever.

The manner in which the walls of the woodcells are dissolved varies in different parts of the trunk. The first change noticeable in both medullary ray cells and the woodcells is the disappearance of the yellow-brown coloring matter. This is followed by the solution of the middle lamellae of the medullary ray cells and the destruction of the lignin elements of the latter, leaving the white cellulose fibres free from one another. These in turn soon disappear completely, and their place is taken by masses of brown hyphae. Similar changes take place in the wood here and there, resulting at first in the conversion of large masses of wood fibres to cellulose; these in turn are completely disintegrated. In the more common form of destruction the woodcells are not converted into cellulose. The hyphae penetrate the woodcells in all directions, riddling the walls with larger and smaller holes, so that they gradually break into small isolated pieces, which can be observed embedded

in the brown mycelium for some time after all semblance to wood structure has been lost. The smallest pieces were shown to be wood, which indicates that the destruction is one which does not pass through the cellulose stage.

The mycelium in the newly invaded parts of the wood consists of thinwalled, almost colorless hyphae, which branch frequently, and penetrate the walls of the wood-cells in all directions. The older hyphae are thickwalled, and dark brown. They fill the large vessels and the spaces formerly occupied by the medullary rays, making a dense network. As the hyphae grow outward through the older wood, they form the peculiar sheets already described. Now and then the hyphae forming the core of a sheet, reach the cambium layer and spread from this point in all directions, killing the living bark and wood, as has been pointed out. A thick felt of hyphae forms in the space under the bark, and at times breaks or grows through the bark, appearing as a small knob on the outside of the trunk. These knobs are light red-brown, and are very hard and smooth. They gradually increase in size, and when about an inch in thickness, pores form on the lower side.

The young sporophore increases in size, and continues to do so for many years. The largest seen was about 16 inches in diameter laterally, and 8 inches from front to back. The mature form consists of one or more broad shelves, the top of which meets the lower side at an angle of about 30°–35° (Plate 2). The shelves are usually almost twice as wide laterally as from front to back. The upper surface in older specimens is composed of a number of ridges which are very distinct in the younger part, but become almost obliterated as the sporophore grows older. The most recent layer forms the front rounded edge of the sporophore, and is characterized by the very smooth surface, which extends over the edge onto the lower side. In some sporophores it is very

light brown, and somewhat villous, in others it is entirely smooth, even shining as if polished, and dark brown. The older parts of the upper surface are dark brown, almost black, and are broken into many small pieces by numerous fissures. Many old sporophores have a jagged, extremely rough surface because of this fissuration. Lichens and mosses frequently cover the older parts.

The lower side of the sporophore is dull red brown.* The pores are exceedingly fine, so that they can scarcely be distinguished with the naked eye, measuring on the average 108×143 μ; the dissepiments are about 108 μ in width. The interior of the sporophore is light brown, with evident though imperfect indication of stratification. The pores are continuous through several layers, remaining open for two or three years. They then become plugged at the base by the growth of hyphae from the walls of the hymenium. The plugging begins here and there in a particular layer and goes on irregularly. That the hyphae of the entire sporophore remain active is shown when parts of the sporophore are broken off, for then vigorous growth starts all over the broken surface, and in the course of a year one or more new sporophores have started, which gradually cover the broken surface and give the whole mass a peculiar appearance.

The hymenium consists of short club-shaped basidia which bear four spherical brown spores, which appear to ripen very rapidly. They are discharged into the pores, and can be noted escaping from the openings in clouds, particularly on moist days. During June and July active discharge was going on. Cystidia are absent from the hymenium; the paraphyses, in the earlier stages, project out into the pores for a short distance, and not infrequently masses of spores are collected about their tips. A very striking fact is the large number of spores which never

* The color approximating an equal mixture of yellow orange shade No. 1, and yellow orange dark, Milton Bradley color scale.

leave the pores, but become imprisoned in the latter, by the ingrowing hyphae. The sporophores were found only on living trees. Their number varied considerably, from single large individuals on younger trees to thirty and forty on older trees, where they grow out on the smaller branches, in the extreme tree-tops.

The characters above given agree well with the description given for *Polyporus* (*Fomes*) *rimosus*, Berk. This fungus was described by Berkeley as growing on logs in Demarara, British Guiana. It is evidently closely related to *Polyporus igniarius* (L.) Fr., on the one hand, and *Polyporus fulvus*, Fr. on the other, differing from both in the extremely hard cracked upper surface, from which it derives its name; from the former, also, in the texture and structure of the internal parts and in its form, which so far as seen never approaches the globose, hoof form. Its color readily distinguishes it from *Polyporus fulvus*, Fr.

As this fungus is essentially a wound parasite, preventive measures can be adopted by caring for the broken branches and other wounds. When but one tree of a group is infected, that tree ought to be cut down and burned so as to prevent infection of the other trees. Where possible the sporophores should be destroyed.

The mycelium of *Polyporus rimosus* does not grow in the wood of the locust after it is cut from the living tree. Diseased locust wood when used for posts does not continue to rot after it is placed in the ground. The fact that the mycelium ceases to grow in the wood after it is cut from the tree, or even after the death of the tree, suggests that the conditions which exist within the trunk of a live tree must be essentially different from those present after death.

There must be some factors which favor the growth of the mycelium while in the wood of the standing tree which are changed or entirely inoperative after the tree is cut down. It is well known that many kinds of wood are

very susceptible to the attacks of timber-destroying fungi while they are still parts of living trees, but as soon as they are cut from the trees not only does all further growth of that particular fungus cease, but the wood seems to be more or less immune for long periods to the attacks of the fungi which attack dead wood. Notable examples of this kind are the woods of the bald cypress and its near allies, the big trees, incense cedar and the various species of red cedar. The heartwood of all of these trees is destroyed (in some instances 90% and more of the living trees are affected) by fungi which do not grow after the wood is cut from the tree. Other trees, for instance the pines, have similar enemies, which grow only on live trees. The cessation of growth may possibly be due to the different moisture content of the wood of live trees, but this cannot be the sole factor, for felled trees do not begin to dry for long periods after cutting. The gases found in live trees may be different from those in the dead tree, both as to their composition and their tension. That there is considerable difference in this respect is shown by the readiness with which the fruiting organs of many of these fungi can be induced to form wherever a wound is made, admitting air.* A further factor which may be of a determining nature, is found in the products formed in the heartwood when exposed to the outside air; these are often made evident by a darkening of the wood. Differences in temperature probably occur. The intrinsic difficulties found in determining the physical condition of the wood while in a live tree do not allow of any more definite statement than those made above.

In this connection, the question arises, what are *Polyporus rimosus*, and the other fungi which grow on live trees, but not on dead wood of the same trees? Their substra-

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* von Schrenk, H. Some Diseases of New England Conifers. Bull. No. 25, Div. Veg. Phys. & Pathology U. S. Dept. of Agriculture. 48. 1900.

tum is dead material in the ordinary sense of the term, for the live part of a tree, as determined by protoplastic cell contents, or their products, starches and oils, extends inward from the bark but a short distance (in the black locust the outermost 15–25 annual rings may be considered alive) differing with the individual and the tree. Hence these fungi are not parasites. As saprophytes, they must be considered such in a special sense, for although they grow on a dead substratum they nevertheless are unable to do so except under very special conditions. The fungi which Tubeuf * includes under hemisaprophytes differ from such a form as *Polyporus rimosus* in that they frequently grow and fructify on dead wood, at least with greater readiness than this fungus.

EXPLANATION OF PLATES.

Plate 1. — Cross-section of the trunk of a living black locust (*Robinia Pseudacacia*) cut at a height of 23 feet from the ground. The heartwood has been destroyed by the mycelium of the *Polyporus rimosus;* a sporophore of the latter appears at the one end of the section, (about ⅓ natural size).

Plate 2. — *Polyporus rimosus,* growing on a living black locust (*Robinix Pseudacacia*), (about ⅓ natural size).

Plate 3. — A transverse section of much decayed wood of the black locust showing the gradual manner in which the wood is being destroyed by the mycelium of *Polyporus rimosus: m,* medullary rays; v, large vessel.

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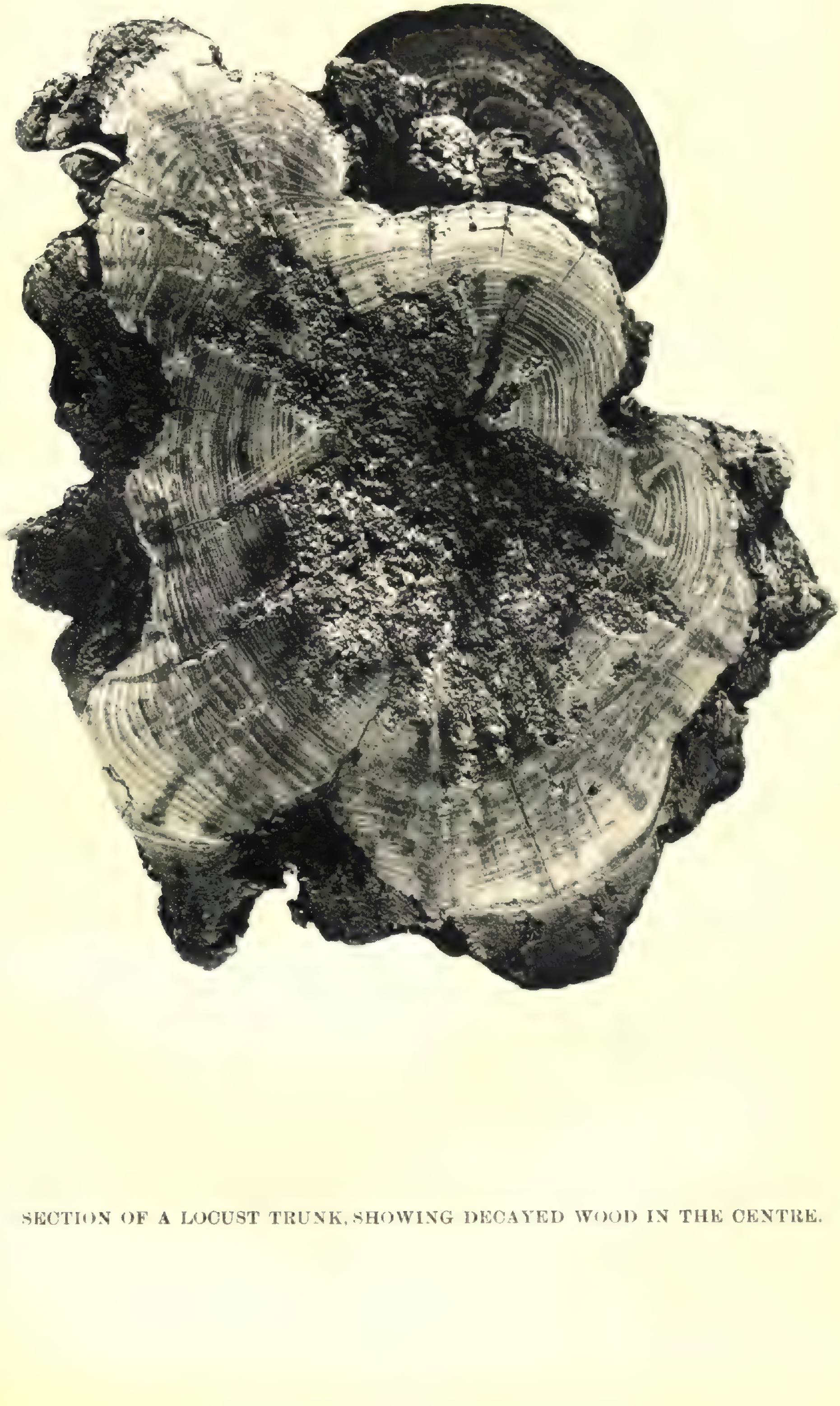
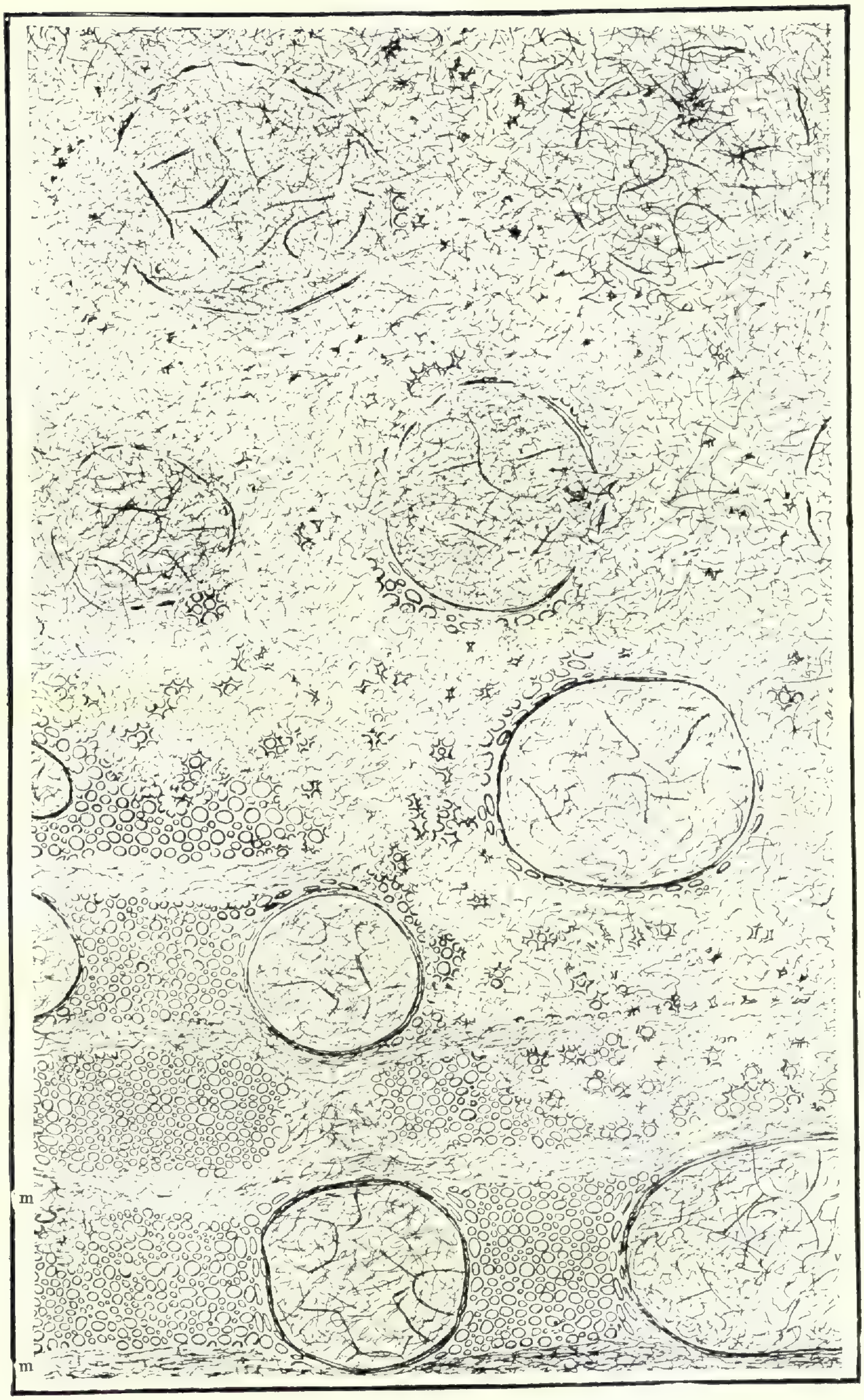
* Tubeuf, Carl Freiherr von. Pflanzenkrankheiten. 8. 1895.



SECTION OF A LOCUST TRUNK, SHOWING DECAYED WOOD IN THE CENTRE.

POLYPORUS RIMOSUS, ON LIVING LOCUST.



LOCUST WOOD, ATTACKED BY POLYPORUS.

CROTONS OF THE UNITED STATES.

BY A. M. FERGUSON.

In the prosecution of this study I have been very fortunate in having the material from the larger American herbaria, from which to draw the descriptions, namely: Missouri Botanical Garden, including the Engelmann collection, Harvard University, Columbia College, National Museum, including the Smithsonian Institution, California Academy of Sciences, Iowa Agricultural College and the Agricultural and Mechanical College of Texas; and I am not unmindful of the favor extended by the gentlemen who have charge of these collections. Hurried examinations have also been made of the specimens in the herbaria of the University of Chicago, Field Columbian Museum, University of Illinois and the Michigan Agricultural College. About a dozen forms have received field study. I wish to express further acknowledgments to Dr. J. N. Rose of the Smithsonian Institution; for the contributions of notes and specimens, to Messrs. J. Reverchon and Wm. Lomas of Dallas, Texas, Mr. S. B. Parish of San Bernadino, California, Prof. H. Ness of College Station, Texas, and to Dr. Charles Mohr of Mobile, Alabama. Lastly, the kindly interest of Dr. William Trelease has made the preparation of this paper possible. It was through him that the collections mentioned above were secured, and also the use of the excellent facilities for such investigation afforded by the Missouri Botanical Garden. For these favors and other assistance in the way of suggestion, criticism and review, I am very thankful.

The genus to which the forms here treated belong was first named *Ricinoides* by Tournefort.* Linnaeus, wishing

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* Tournefort, Inst. Herb. 565. *pl. 423.* 1700.

to avoid such use of words ending in *-oides*, renamed it *Oxydectes** in 1735, though in 1737 he changed it to *Croton*.† It remained practically intact till the second quarter of the present century. The first monograph was by Geiseler ‡ in 1807, who enumerated about one hundred and twenty species. Afterwards, the genus received considerable attention in a scattered way, many sections being segregated and new genera split off from it, chiefly by Klotzsch, though most of his genera were subsequently reunited under *Croton*. Baillon presented the result of his studies of the *Euphorbiaceae* in the Parisian herbaria in 1858 in an elaborate work. He divided the forms covered by this paper, into nineteen sections, besides recognizing five genera now included under *Croton*. The last and most comprehensive work was by Jean Mueller von Argau,§ and his arrangement is the one generally accepted at the present time and has been the basis of my own study.‖ Of the ten sub-genera recognized by Mueller, seven are represented in our territory, three of which are aberrant groups peculiar to this region.

Croton, like other Euphorbiaceous genera, has few species that admit of a rigid definition of characters. In a restricted locality few variations will be noticed. Especially is this true of *C. Texensis* (Klotzsch) Muell. Arg., and yet the extreme western, the extreme northern and extreme southern forms are in habit characters noticeably different. All Crotons are more or less pubescent, either scaly or stellate, and the particular form of these trichomes is often peculiar to a species or higher group. And indeed,

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* Linnaeus, Syst. Nat. 1735.

† Linnaeus, Gen. Plant. 288. 1737; Crit. Bot. 37. 1737.

‡ Geiseler, Crot. Monog. 1807.

§ Muell. von Arg., in DC. Prod. **15**^{2} : 512 to 700. 1866; and in Martius, Flor. Bras. **11**^{2} : 82 to 274. F. 1873.

‖ See Bentham, in Benth. and Hook. Gen. Plant. **3** : 293 to 296. 1880; also Journ. Linn. Soc. Bot. **17** : 223. 1878. Pax, in Engl. and Prantl, Pflanzenfamilien **3**^{5} : 37 to 40. Ap. 1890.

a recent investigator* has constructed an analytical key for something like one hundred fifty species, depending largely on the pubescence for the distinctive characters.

It has been thought advisable to cite only the original descriptions and others of special interest, and the more common floras of the region covered; and all synonyms where determined. Citations in brackets have not been verified. With a few exceptions, the many names of Rafinesque have not been cited, because of my inability to state beyond serious doubt just what forms he referred to. However, I have gone over most of his publications and conjecturally determined most of his names, and do not think that any of his names could claim priority over the ones here recognized.

CROTON Linn. (Gen. Plant. 288. 1737); Sp. Plant. 1004. 1753.

Herbs or shrubs; scaly or stellate pubescent; leaves alternate, mostly stipulate; monoecious or dioecious. Flowers mostly in terminal spike-like racemes: staminate flowers with a 5- (rarely 4- to 6-) divided calyx; petals 5, when present, alternating with as many glands of the disc, stamens 5 or more, with anthers inflexed in the bud; pistillate flowers with a 3- to 10-parted calyx, the margins of the sepals not dissected; petals present, rudimentary or obsolete; staminodes rare; ovary 3- (rarely 2- to 4-) celled, separating at maturity into as many 2-valved 1-seeded carpels (in *C. monanthogynus*, Michx. the capsules become one-seeded by the regular abortion of one of the two ovules); seeds carunculate. Found usually on sandy soil, or dry rock regions.

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* Froembling, Blatt und Axe der Crotoneen und Euphyllantheen. (Bot. Centralbl. **65**: 129 &c.) 1896.

KEY TO SPECIES OF CROTON OF THE UNITED STATES.

I. Staminate and pistillate flowers petaliferous. *C. Alabamensis.*

II. Staminate flowers petaliferous; petals absent or rudimentary in pistillate flowers.

A. Scaly. *C. argyranthemus.*

B. Stellate.

a. Shrub; margins of leaves entire or nearly so; the 5-parted pistillate calyx not accrescent.

1. Leaves ovate to ovate-lanceolate, cordate or rounded at base.

Stamens 15 to 35; sepals stellate. *C. Berlandieri.*

Stamens 10; sepals stellate. *C. fruticulosus.*

Stamens 15; sepals glabrous. *C. Sonorae.*

2. Leaves elliptical to oblong or lanceolate.

Leaves elliptical, thickish, very densely stellate. *C. suaveolens.*

Leaves oblong, discolor, stellate above and below. *C. Torreyanus.*

Leaves oblong to lanceolate, glabrous above; racemes unisexual; capsules bristly pubescent, numerous. *C. Cortesianus.*

3. Leaves elongated-oblong to linear.

Leaves narrowly linear, glabrous above. *C. linearis,* form A.

Leaves elongated oblong, microscopically umbonate-stellate above. *C. linearis,* form B.

b. Shrub, or annual; margins of leaves not entire, base biglandular; branches striate, except in *C. betulinus;* the 4- to 5-parted calyx accrescent.

1. Shrub; leaves ovate, 1 to 2 cm. long. *C. betulinus.*

2. Annual; leaves ovate, 2 to 4 cm. long. *C. Miquelensis.*

3. Annual; erect, slender; leaves elliptical to lanceolate; calyx segments glabrate. *C. Floridanus.*

4. Annual; leaves usually oblong, margins variously interrupted to almost entire. Varieties of *C. glandulosus.*

Appressed stellate; low; leaves small, 1 to 2 cm., elliptical. *C. glandulosus Lindheimeri.*

Thinly stellate; upper leaves oblong, entire or serrato-crenate. *C. glandulosus Shorti.*

Densely stellate; low; leaves ovate, coarsely serrato-crenate. *C. glandulosus Simpsoni.*

Coarsely stellate; upper leaves oblong, serrate. *C. glandulosus septentrionalis.*

Thinly appressed stellate; upper leaves elongated-oblong, crenate. *C. glandulosus crenatifolius.*

Thinly appressed stellate; upper leaves linear, distantly serrate *C. glandulosus angustifolius.*

c. Annual; margins of the leaves entire or nearly so; calyx of the short pedicelled, capitate or racemose pistillate flowers 3- to 8-parted and accrescent.

1. Calyx 6- to 8-cleft; styles twice or more bicleft.

Petioles long; leaves slightly or not at all cordate; capsules large, often forming a cluster at base of raceme, covered with a woolly, purplish tomentum. *C. capitatus.*

Petioles short; leaves cordate; pistillate flowers racemose.

Woolly tomentum of the calyx yellowish. *C. Engelmanni.*

Appressed tomentum white. *C. Engelmanni albinoides.*

Petioles short; leaves lanceolate; pistillate flowers capitate, smaller than in *C. capitatus*, not loose woolly. *C. Muelleri.*

Petioles short; leaves linear; sepals hooded. *C. Elliottii.*

2. Calyx very unequally 5-cleft; leaves ovate; styles bicleft. *C. leucophyllus.*

3. Calyx 3-cleft by abortion of two inner sepals. *C. leucophyllus trisepalis.*

d. Suffruticose; margins of leaves entire; pistillate flowers long pedicelled, racemose, or rarely from the base of the raceme; calyx 5-parted, often accrescent; capsule 3-celled. *C. corymbulosus.*

e. Annual; margins of leaves entire; pistillate flowers not racemose, i.e., from the base of the raceme, at length pendent; calyx 3- to 5-parted, sometimes accrescent.

Ovary 3-celled, capsule 3-seeded; leaves oval. *C. Lindheimerianus.*

Ovary 2-celled, capsule 1-seeded. *C. monanthogynus.*

III. Pistillate and staminate flowers apetalous; calyx 5-parted, never accrescent; dioecious, or sometimes monoecious in *C. punctatus;* stipules obsolete.

A. Suffruticose or perennial; branches scurfy, whitish.

a. Both sides of leaves stellate or scaly-stellate; staminate raceme rarely exceeding 3 cm. in length.

Diffuse; near sea-shore along the lower Atlantic and Gulf coasts. *C. punctatus.*

Procumbent (erect in the varieties) or ascending; leaves long petioled, oblong or oval, stellate. *C. Californicus.*

Leaves stellate, short petioled, oblong to lanceolate. *C. Californicus tenuis.*

Leaves oval, only slightly stellate above. *C. Californicus longipes.*

Leaves oval, small; stems much branched, digitate. *C. Californicus Mohavensis.*

b. Leaves only slightly, or usually not at all, pubescent above; generally oblong; staminate raceme 4 cm. or more long. *C. Neo-Mexicanus.*

B. Annual; erect; capsules generally muricate. *C. Texensis.*

C. Annual; slender; capsules yellowish, never muricate (local). *C. virens.*

I. Staminate and pistillate flowers petaliferous.

C. ALABAMENSIS E. A. Smith, in Chapman, Suppl. Fl. South. U. S. 648. 1883; Mohr, Garden and Forest 2: 592. *f. 150.* Dec. 1889; Chapman, Fl. South. U. S. 429. 1897. [3d ed.]

Shrub, 2 to 3 m. tall, the stem 3 to 6 cm. in diameter when grown, spreading, much branched; bark grayish white; leaves persistent till succeeding spring or autumn, subtended by small, exceedingly deciduous stipules (Mohr, l. c.), thin but firm, oblong, 5 to 8 cm. long, 3 to 5 cm. broad, rounded and usually glandless at the slightly oblique base, entire or somewhat undulate, strongly channeled, green and glabrate above, below densely set with overlapping argenteous scales as are also the branches and inflorescence; racemes bi- or unisexual, 3 to 5 cm. long, few to many flowered; staminate flowers 10 to 20 with slightly broader and more rounded, ciliate petals and sepals than the pistillate flowers; stamens 10 to 25; filaments glabrous above; receptacle densely stellate tomentose; pistillate flowers 4 to 7, on pedicels 4 to 8 mm. long at maturity of fruit; calyx 5-parted, the sepals acute, 3 to 4 mm. long, equalling or slightly exceeding the thin narrow, ciliate petals which are scaly on their outer face; glands 5, oblong; ovary bearing 3 flattish, slightly emarginate styles, about 4 mm. long; capsule trigastric, scaly, 6 to 8 mm. long, depressed at apex; seeds oval, 5 to 7 mm. long, unequally biconvex, brown or variegated. — Forming dense thickets and quite local, according to Dr. Mohr. "There are only a few of these thickets of the Alabama Croton, called by the inhabitants of the region 'Privet brakes' known, and these all found close together, and it is possible that it does not extend beyond a few miles square." — Mohr, l. c. — Plate 4.

Specimens examined collected by Mohr, Limestone hills, Little Cahawba River, Bibb Co., June, 1884; Celiohe, 1883; A. W. Wright, a leaf, 1886; E. A. Smith, Cult. at Chattanooga.

II. Staminate flowers petaliferous; petals absent, or often rudimentary in the pistillate.

A. Scaly.

C. ARGYRANTHEMUS Michx. Fl. Bor. Am. **2**: 215. 1803; Geiseler, Crot. Monog. 49. 1807; Engelm. and Gray, Boston Jour. Nat. Hist. **5**: 233. 1847; Torrey, Bot. U. S. and Mex. Bound. Surv. 195. 1859; Muell. Arg. in DC. Prod. **15**^{2}: 576. 1866; Wood, Class Book 631. 1861. *C. punctatus* Coulter, Bot. West. Texas 397. 1894. *Oxydectes arygranthemus* Kuntze, Rev. Gen. Plant. 611. 1891.

Suffruticose, erect, 3 to 6 dm. high, approximately branched above, scaly, argenteous or sometimes ferruginous; lower leaves oval to obovate, upper ones oblong to lanceolate-oblong, 1 to 5 cm. long, narrowed toward the base (an obtuse or rounded base in the oval-leaved forms from south-west Texas), apex obtuse to rounded, scales scattered above, at length almost glabrous, argenteous below; petioles about one half to one fourth the length of the leaves; stipules obsolete; racemes sessile, many flowered, 2 to 5 cm. long; staminate flowers many, upwards of 15, on pedicels 1 to 4 mm. long, with setaceous and very deciduous bracts, normally pentamerous; sepals lanceolate, acute; petals oblong, glabrous on the inside, scaly outside; stamens about 10; filaments with tumid base; pistillate flowers 2 to several, short pedicelled or subsessile at base of raceme; calyx cup-shaped with 5 to 7 acute clefts; apetalous; glandular disc 5-lobed or entire; styles 3, 2 to 4 mm. long, each 3- to 4-palmately cleft at tip; capsules oval, about 5 mm. tall, slightly depressed at the apex, trigastric; seeds oval, 4 to 5 mm. long, unequally biconvex; caruncle prominent and stipitate; calyx accrescent, about one half the length of the capsule. — Georgia to southwest Texas and New Mexico. — Plate 5.

Specimens examined from Georgia (Le Conte; Quitman, no. 188; Small, Albany, 1895); Florida (Curtiss, nos. 2522, 4272, 4932; Duval Co.;

1876; no. 6157, Dry pine barrens, Jacksonville; Canby, 1869; Garber, Gainesville, 1876; Palmer, no. 407, east Fla.; Nash, no. 358, Eustis; no. 1849; Wood, Wakula Spring, 1857; Buckley; Chapman; Webber, no. 126; Hitchcock, 1890; Ferguson, Tampa, 1898); Louisiana (Leavenworth, Tracy, no. 3504); Texas (Berlandier, nos. 294, 1554, 2552; Drummond, no. 333 = 275; Lindheimer, no. 173, 1843; Hall, no. 574; Buckley, 1882; Nealley, 1884; Heller, no. 1547, Corpus Christi Bay), B. Frank, "Civitatis Missouri," 1835, is probably from a middle Gulf state.

B. Stellate.

a. The 5-parted pistillate calyx not accrescent; margins of leaves entire or nearly so; small much branched shrubs of Florida or the South-west.

1. Leaves ovate to ovate-lanceolate, cordate or rounded at base.

C. BERLANDIERI Torrey, Bot. U. S. and Mex. Bound. Surv. 193. 1859; Muell. Arg. in DC. Prod. **15**^{2}: 587. 1866. *C. balsamiferus* Chapman, Fl. South. U. S. 407. 1860; Young, Fl. Texas 484. 1873; Coulter, Bot. West. Texas 399. 1894. *C. humilis* Muell. Arg. in DC. Prod. **15**^{2}: 670. 1866; Chapman, Suppl. Fl. South. U. S. 648. 1883; Coulter, Bot. West. Texas 398. 1894. *Oxydectes Berlandieri* Kuntze, Rev. Gen. Plant. 611. 1891.

A low shrub 3 to 8 dm. high; current branches stellate pubescent and viscid, the young branches incanous, at length smooth and whitish; leaves ovate to oblong, 2.5 to 3.5 cm. long, base rounded to subcordate, the basilar glands often abortive, apex mostly abruptly acute, seldom acuminate, margins somewhat repand, the veins usually terminating in minute glands at the margins, tomentose above when young, becoming subglabrous, paler and pubescent below; monoecious or dioecious; the racemes when staminate or bi-sexual are slender and slightly nodding, 3 to 5 cm. long, bearing 2 to 4 scattered pistillate flowers, or when purely staminate becoming longer, 5 to 7 cm.; staminate flowers 3 to 4 mm. broad, pedicels as long; sepals oval; petals spatulate, equalling the sepals, usually ciliate near the base; stamens 30 to 35 in western forms, 15 to 20 in the Florida forms; pistillate racemes 2 to 2.5

cm. long, 3- to 6-flowered, the pedicels about 2 mm. long or by exception longer; sepals oblong-spatulate, about 4 mm. long, apex acute, marginal glands sessile or short stipitate, rarely absent; petals represented by subulate processes 1 mm. or so long; styles 3, palmately 4-parted or abruptly twice biparted, 3 to 5 mm. long, stellate; capsule globose, 4 to 5 mm. tall, trigastric; seeds oval, depressed at the oblong caruncle.

These forms have been alternately referred to *C. balsamiferus* and *C. humilis*. *C. balsamiferus*, according to Muell. Arg., who makes it a variety of *C. flavens*, has 15 to 20 stamens and a biparted style. *C. humilis* has twice biparted styles and 30 to 35 stamens. The Florida forms of *C. Berlandieri* Torrey have 15 to 20 stamens and twice biparted styles, while the Texas forms have 30 to 35 stamens, and similarly divided styles. All our forms are less glandular and more pubescent and have shorter pedicelled flowers than the Jamaica forms of *C. humilis*. Mueller v. Arg. in DC. Prodromus leaves us in doubt as to just how he interpreted their affinities. Under *Eucroton* we have "*C. Berlandieri* (Torr. Mex. Bound. Surv. p. 193) * * * In Novo Mexico ad Nuevo Leon (Thurber n. 708, Berlandier no. 2125 ex. Torr.)." Under *Astraea* he has *C. humilis* and the following citations: "* * * * in Mexico orientali prope Matamoros (Berlandier n. 2125!), nec non in Florida (Cabanis! in hh. berol.)," and as a synonym "*C. Berlandieri* Torr. Mex. Bound. Surv. p. 193(ex hb. Kew)."—Plate 6.

Specimens examined from Mexico (Berlandier nos. 708, 2125, Matamoros; Thurber no. 869); Texas (Heller no. 1477, Corpus Christi; Nealley, no. 84 = 453, Brazos Santiago); Florida (Garber, 1877; Blodgett; Curtiss, no. 2520; Palmer, no. 489; Bennett—all from Key West; Chapman, South Florida).

C. FRUTICULOSUS Engelm. in Torrey, Bot. U. S. and Mex. Bound. Surv. 194. 1859; Muell. Arg. in DC. Prod. 15²: 633. 1866, including the varieties *pallescens* and

fuscescens; Coulter, Bot. West. Texas 398. 1894. *C. Sonorae* Millspaugh in Pittonia **2**:90. 1890; Coulter, l. c. — not of Torrey*. *Oxydectes fruticulosus* Kuntze, Rev. Gen. Plant. 611. 1891.

Shrub, 1 or so m. high; branches densely stellate — tomentose, cinereous or frequently yellowish, at length glabrous below; leaves ovate to ovate-lanceolate, 3 to 8 cm. long, 2 to 4 cm. wide, acute or acuminate, entire or remotely and minutely denticulate-glandular, base truncate or cordate, soft tomentose below like the branches and inflorescence, puberulent above, though frequently smoothish and green; petioles 1 to 3 cm. long, a third to a half the length of the leaves; stipules obsolete; monoecious, rarely dioecious; racemes 3 to 12 cm. long, nude at base; staminate raceme interrupted; pedicels 3 to 4 mm. long; bracts small, subulate; calyx of 5 oval, acute sepals; petals

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* C. Sonorae Torrey, Bot. U. S. and Mex. Bound. Surv. 194. 1859; Muell. Arg. in DC. Prod. **15**^{2}: 695. 1866. *C. Pringlei* Watson, Proc. Am. Acad. Arts and Sci. **12**: 373. 1885.

Shrub, 1 to 2 m. high, current branches and petioles canescent with fine stellate pubescence; leaves thin, oval to oblong-ovate, 2 to 4 cm. long, acute or acuminate, nearly glabrous above, somewhat thinly mealy-pubescent below, especially on the veins, not glandular at base or on margins, or rudimentary glands exceptional; petioles short, 5 to 10 mm. long; stipules obsolete; racemes generally bisexual, 2 to 8 cm. long, loosely flowered; staminate flowers with the pedicels and 5-divided calyx nearly glabrous; petals oblong, about equalling the sepals, ciliate, especially at the base; glands large and spherical; stamens 15 (12 to 18); filaments slender and glabrous; bracts short, setaceous, glabrous; pistillate flowers 2 to 4, near the base of the raceme; the small bracts and 5 spreading, deltoid sepals glabrous, the short pedicels and ovary stellate; petals linear subulate or absent; gland annular or slightly 5-angled; styles 3, biparted, slender, about 2 mm. long; capsule oblong spherical, glabrescent when old, 5 to 6 mm. wide, 6 to 7 mm. long. — In Torrey's type specimen the styles are bicleft at apex, but the flowers are abnormal. The staminate flowers are also abnormal in that the inner circle of stamens are sessile and invested by a stellate membrane separating them from the others which are normal. — Plate 8.

Specimens examined from Sonora (Schott, III. no. 17, Sierra de Nayas, July, 1855, in Columbia University herb.; Pringle, Northwestern Mts., Aug. 1884; Palmer, no. 180, Ravines and mesas about Guaymas).

5, oblong-spatulate, ciliate, longer than the sepals; glands oval; stamens 9 to 10, exserted, the filaments pilose at the base; pistillate flowers 2 to 5, subsessile; sepals oblong to oblanceolate; petals none or only stellate rudiments; gland annular, slightly lobed; styles 3, divided nearly to the base, terete or channeled, slender, about 5 mm. long; capsule globoid, 5 to 6 mm. tall, depressed at the apex, slightly trigastric; seeds oval, 4 to 5 mm. long; caruncle oblong.— Seemingly quite variable, but this due to different exposures.— Plate 7.

Specimens examined from Texas (Lindheimer, no. 525, Cibola, Comal, Guadalupe and New Braunfels, "Small shrub much branched from the root, on rocky soil"; Berlandier, no. 3212, in part; Wright, no. 639; no. 1803, Limestone hills, Big Bend of Devil's River, 1852; Rio Grande, 1848; Havard, no. 13, Fort Davis, 1881 and 1883; Nealley, no. 527*a* = 456, Chenate Mts., no. 793 = 456; Buckley, Austin, 1882; Reverchon, no. 1595, "Rocky bluffs on the Llano and southward;" Heller, no. 1842, Kerville,— this like some of Lindheimer's with nearly glabrous leaves; Hall, Austin, 1872; Trelease, San Marcus, 1897; Bodin, no. 526; Jermy, no. 565, Gillespie Co.; Palmer, no 1235, Uvalde; Bigelow, Mts. of Muerta and Buesta, 1852; Leon Springs, 1850; Schott, San Felipe, up to the Pecos Limestone, 1852; Ferguson, 1900); New Mexico (Vasey, Organ Mts., 1881); Mexico (Pringle, no. 264, Santa Eulalia Mts.; South, Cañon of Guadalupe, Sonora).

2. Leaves elliptical to oblong or lanceolate.

C. SUAVEOLENS Torrey, Bot. U. S. and Mex. Bound. Surv. 194. 1859; Muell. Arg. in DC. Prod. **15**^{2}:659. 1866; Coulter, Bot. West. Texas 398. 1894.

Shrub, stout, much branched, cinereous or ochroleucous, densely and coarsely stellate-tomentose; branches short, jointed; leaves thickish, ovate or elliptical, entire, obtuse, sometimes mucronate, rounded or narrowed at the base, loose tomentose on both sides, cinereous below, darker above, especially in the Texas forms, 2 to 4 cm. long, 1 to 2.5 cm. broad; petioles short, 5 to 15 mm. long; stipules papillo- or cylindrico-glandular, not often rising above the tomentum; racemes bisexual, unisexual or plants even dioecious, stout, short, 2 to 4 cm. long, closely flowered;

bracts simple or variously lobed or divided, glandular; staminate flowers on pedicels 4 to 8 mm. long; calyx equally 5-parted, the sepals ovate to lanceolate; petals 5, densely ciliate, equalling the sepals; stamens about 15; receptacle tomentose and glandular; pistillate flowers usually 2 or more at the base of the raceme, subsessile or short pedicelled; calyx teeth oblong, acute; petals reduced to small subulate or cylindrical glands; disc with 5 large, oblong glands; styles 3, biparted, 3 to 6 mm. long, terete, or flattish and sulcate; capsule globose, 6 to 7 mm. long; seeds about 5.5 mm. long; calyx not accrescent.—"The *C. suaveolens*, a small shrub in the foot hills of mountains, exhaling a delicious fragrance, would probably likewise make an excellent tea." * — Plate 9.

Specimens examined from Mexico (Wright, no. 1804, "On the Rio Grande" — Ex Torrey, l. c.; Pringle, no. 140, Rocky hills near Chihuahua); Texas (Havard, no. 12, Ft. Davis; Nealley, nos. 615=460, 138, both from Limpia Cañon).

C. Torreyanus Muell. Arg. in DC. Prod. 15^2:579. 1866; Coulter, Bot. West. Texas 398. 1894. *C. suaveolens* var. *oblongifolium* Torrey, Bot. U. S. and Mex. Bound. Surv. 194. 1859.

Shrub 1 to 2 m. high, rather straight, slender, with velutinously stellate branches; leaves oblong to elongated-oblong, generally obtuse at both ends, mucronulate at the apex, densely stellate tomentose and whitish below, dark green and tomentose above, 3 nerved at base, penninerved upwards, 3 to 5 cm. long, 15 to 25 mm. broad; petioles short, 7 to 15 mm. long; stipules subulate, 2 to 3 mm. long, deciduous; staminate raceme many flowered, 2 to 4 cm. long; flowers with oblong subacute sepals; petals oblanceolate, slightly ciliate at base; gland large, thickish; stamens 12 to 15; pistillate flowers generally 3, at base of

* Dr. Havard, U. S. A., Report on the Flora of Western and Southern Texas, in Proceedings of the United States National Museum 8:514. 1885.

raceme, short pedicelled, with 5 subequal, acuminate sepals; petals represented by small subulate bodies covered with tufts of stellate tomentum; ovary densely stellate, the stellates extending well up the lower side of the 3-divided styles; capsule densely stellate, oblong, about 7 mm. long, trigastric, depressed at the apex, 2- to 3-seeded; seeds about 6 mm. long, 4 mm. broad, subequally biconvex, glabrous, depressed at the base of the oblong, stipitate caruncle. — Plate 10.

Specimens examined from Texas (Wright, no. 640, El Paso; Nealley, no. 199 = 462, Hidalgo; Schott [Mex. Bound. Surv. no. 1295], "Rocky ravines near the Rio San Pedro and from there upwards, Oct., 1852"), New Mexico (Wright, no. 1802, Painted Cave); Mexico (Gregg, no. 201, Monterey, no. 819, Papagallas; Thurber, nos. 289 and 868, Papagallas; Palmer, no. 1236, Monclova; Edwards and Eaton, Monterey, 1846). Heller, no. 1429, Nueces Bay, Texas, seems to come under this species.

C. Cortesianus Kunth, Nov. Gen. et Sp. Plant. **2**: 83. 1817; Muell. Arg. in DC. Prod. **15**^{2}: 627. 1866; Coulter, Bot. West. Texas 398. 1894. *C. trichocarpum* Torrey, Bot. U. S. and Mex. Bound. Surv. 196. 1859.

Shrub, 2 to 3 m. high, loosely di- or trichotomous; branches cinereous, stellate pubescent; leaves oblong to lanceolate; subacute or rotund at base; apex acute or acuminate; green and glabrous above, cinereous below, entire or denticulate, 3 to 10 cm. long; petioles 5 to 18 mm. long; racemes unisexual; the staminate interrupted, slender but rigid, 1 to 2 dm. long; flowers small, short pedicelled, with very broad bracts; petals oblong, ciliate at base; stamens 12 to 16; pistillate raceme sessile, short, about 4 cm. long, congested, 15- to 20-flowered, globose, becoming oblong and less hispid at maturity; rachis swollen; flowers sessile; petals linear or rudimentary; gland forming a 5-lobed disc; ovary hispid-stellate; styles 3, biparted, 4 to 5 mm. long; capsule globose, densely and coarsely hispid, depressed at apex, commissure feebly

marked, 6 to 8 mm. tall; seeds about 5 mm. long, 3.5 to 4 mm. broad. — Plate 11.

Specimens examined from Texas (Nealley, no. 178*a* = 454, Santa Maria, Cameron Co.); Mexico (Berlandier, nos. 824, 1540, 2244, 3003, 3040, 3212 in part and 6503 = 1503 ?, Matamoros to San Fernando, 1828–43; Pringle no. 3079, Las Palmas, no. 1138½, San Luis Potosi to Tampico, is staminate and corresponds to no. 1147).

3. Leaves elongated-oblong to linear.

C. LINEARIS Jacq. [Enum. Pl. Carib. 32. 1760], Amer. Hist. Nat. 257. *t. 162. f. 4.* 1763; Lamarck, Encycl. Meth. Bot. **2**: 204. 1786; Aiton, Hort. Kew. **3**: 374. 1789; Geiseler, Crot. Monog. 6. 1807; Bennett, Jour. Proc. Linn. Soc. **4**: 30. 1860; [F. Daniell, On the Cascarilla Plants 13. *t. 3. f. 2* and *3*. 1863]; Muell. Arg. in DC. Prod. **15**^{2}: 615. 1866; Chapman, Suppl. Fl. South. U. S. 648. 1883. *C. Cascarilla* Linn. Sp. Pl. 1423. 1763. [2d and 3d ed.]; Griseb. Fl. Brit. West Ind. 38. 1864; Woodv. Med. Bot. 629. *t. 222.* 1832; Geiseler, Crot. Monog. 8. 1807. *C. hippophaeoides* Rich. in Ram. de la Sagra, Hist. Nat. etc. Cuba **11**: 212. 1850. *Clutia Cascarilla* Linn. Amoen. Acad. **5**: 411. 1759. — Not Sp. Pl. ed. 1.

FORM A.* Shrub 1 to 2 m. high, di- or trichotomous, branches scabrous and grayish, the current wood and in-

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* Form B, and probably form A, are specifically distinct and the disposition here made of them is to be regarded as tentative only. I was not able to personally examine an authentic specimen of *Croton linearis* or *C. Cascarilla*, but sent specimens of each of our forms to Kew for verification, which was very kindly done. They were returned with the following notes: —

"186, Simpson.

This is true *Croton linearis*, Jacq. It varies much in the breadth and obtuseness of its leaves; in some of the Kew specimens they are 4–5 times as broad as in this specimen and obtuse or retuse."

[Signed] N. E. BROWN.

"5360, Curtiss.

This appears to be scarcely more than a variety of *C. linearis* Jacq., its leaves varying exactly in the same way, one specimen at Kew (Eggers,

florescence densely stellate and ochroleucous; petioles less than 5 mm. long; stipules obsolete; leaves linear, 4 to 7 cm. long, 3 to 5 mm. wide, apex obtuse, slightly narrowed toward the biglandular base (glands sessile, often abortive), dark green, smooth and channelled above, lateral veins absent or very dimly marked, margins entire and plane or very slightly inflexed, densely stellate-tomentose and argenteous below; dioecious; racemes terminal or pseudo-axillary, several- to many-flowered, interrupted; staminate raceme 4 to 8 cm. long or longer; flowers about 2 mm. broad, on pedicels about 1 to 2 mm. long; calyx of 5 to 6 subequal, deltoid sepals; petals spatulate, obtuse, ciliate, longer than the calyx; stamens about 15, exserted; receptacle pilose; pistillate raceme 4 to 5 cm. long, frequently exceeded by the leaves, 4- to 7-flowered, pedicels 2 to 3 mm. long at maturity of fruit; bracts deltoid, the two lateral ones small; sepals acuminate, incanous; gland annular; petals rudimentary or none; styles 3, short and stout, bicleft or exceptionally twice bicleft; capsule subglobose, strongly trigastric, 5 mm. long, depressed at the apex, covered with a flocculose orchroleucous pubescence; calyx not accrescent; seeds oblong, 3 mm. long, angulate-convex. — Plate 12.

Specimens examined from Florida (Blodgett, Pine Key; Garber, no. 292; Simpson, no. 250, Big Pine Key, no. 186, No Name Key; Pollard, et al. Big Pine Key, 1898).

Form B. Shrub, probably 1 m. or so high, much branched; stems grayish or whitish, the branchlets, lower sides of the leaves and inflorescence, densely stellate and yellowish, the upper side of the leaves green, but densely covered with very minute, umbonate stellates; margins entire, inflexed in dried specimens, elongated oblong, 3 to

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4013) being identical in habit and narrowness of leaf with 186, Simpson. It differs from *C. linearis*, however, in having fewer female flowers in a raceme, with longer pedicels, and in the minute tomentum on the upper surface of the leaves." [Signed] N. E. Brown.

4.5 cm. long, 6 to 12 mm. wide, round at the apex, narrowed at the base, channelled above; petioles .5 to 1 cm. long, sulcate; stipules obsolete; dioecious; staminate raceme 3 to 5 cm. long, stout, interrupted, 12- to 25-flowered; pedicels about 2 mm. long; flowers about 2.5 mm. broad; sepals acute and deltoid; petals densely ciliate, oblong-clavate, 2.5 to 3 mm. long, longer than the sepals; stamens about 15; receptacle pilose; pistillate raceme 2 to 3 cm. long, bearing about 6 flowers; pedicels about 2 mm. long at maturity of the subglobose capsule, which is about 5 mm. tall, triquetrous, 1- to 3-seeded; styles bicleft, stout, about 1.5 to 2 mm. long; seeds punctate-impressed, truncate at the oblong caruncle, 3.5 to 4 mm. long. — This cannot be *C. Cascarilla* and very doubtfully even a form of *C. linearis*, because of the dense pubescence on the upper side of the leaves. See foot-note, page 46. — Plate 13.

The material observed so far is as follows: Curtiss, no. 2525*c*, Biscayne Bay, 1881, no. 5360, Sand ridges near the ocean, Palm Beach, 1895; Palmer no. 488, Biscayne Bay, 1874; Hitchcock, Watling, Bahama, 1890.

b. Shrub or annual; branches striate, except in *C. betulinus*; the 4- to 5-parted calyx accrescent; margins of leaves not entire, base biglandular.

C. BETULINUS Vahl, Symb. Bot. **2**: 98. 1791, in Geiseler, Crot. Monog. 53. 1807; Muell. Arg. in DC. Prod. **15**^{2}: 595. 1866; Chapman, Suppl. Fl. South. U. S. 648. 1883; l. c. 430. 1897. [3d ed.]

Shrub, 1 to 2 m. high, thichotomous; branches slender, pubescent with short, spreading, stellate hairs, the tips incanous; leaves ovate, 1 to 2 cm. long, apex obtuse, base rotund or truncate and biglandular, crenato-dentate, basilar margin subentire, stellate, the hairs fine and loosely spreading above, subappressed-tomentose below; petioles about one half the length of the leaves; stipules small, short and thick; racemes 2 to 3 cm. long, many flowered; bracts lanceolate, 1 to 2 mm. long, persistent, their stipular

glands relatively large; staminate flowers on pedicels 1 to 2 mm. long; sepals oblong-oval; petals oblanceolate, ciliate; stamens 9 to 12, barely exserted, pilose at the base of the filaments; pistillate flowers 1 to 3, subsessile at the base of the raceme, calyx of 5 subequal clavate sepals; petals small, subulate, or sometimes obsolete; gland prominent, the lobes extending about one third the length of the sepals; styles 3, biparted, 1 to 2 mm. long; capsule pilose, oblong-oval, 4.5 to 5 mm. long; seeds oblong, punctate, 3 to 3.5 mm. long, caruncle stipitate; calyx accrescent, nearly equalling the capsule. — Plate 14.

Specimens examined from Florida: Curtiss no. 180, Rocky pine woods bordering Bay of Biscayne, no. 5840, Miami.

C. MIQUELENSIS n. n. *C. chamaedryfolius* Griseb. Fl. Brit. West Ind. 41. 1864; Muell. Arg. in DC. Prod. **15**^{2} : 686. 1866. — Not Lamarck, Encycl. Meth. Bot. **2**: 215. 1786, which is an *Acalypha*. *Geiseleria chamaedryfolia* Klotzsch, in Hooker, London Jour. Bot. **2**: 47. 1843; Miquel, Stirp. Surinam. Select. 99. *pl. 30*. 1850.

Annual, 4 to 8 dm. high, short stellate-pubescent; leaves ovate-lanceolate, 2 to 4 cm. long, crenato- or serrato-dentate, base often oblique, generally truncate or slightly cordate, biglandular, finely pubescent below, puberulent above; petioles about 1 cm. long, shorter above; raceme short, usually about 1 cm. long, generally simple and terminal; staminate flowers few, on short pedicels; bracts setaceous, the stipular glands small; petals narrowly oblong and ciliate; stamens 8 to 10; pistillate flowers 3 to 4, on bracteate pedicels 2 to 5 mm. long, the upper ones almost equalling the staminate portion of the raceme; calyx of 5 subequal, lanceolate sepals; petals none, or mere rudiments; styles 3, biparted; capsule globose, 3 to 3.5 mm. broad, almost equalled by the accrescent sepals.

Collected by Curtiss, no. 15, ballast earth at Pensacola, Florida, 1886.

C. Floridanus n. sp.

Annual or suffruticose, ligneous, slender, erect, freely branching, di- or trichotomous above, appressed stellate, scabrous, 2 to 5 dm. high; leaves ovate or elliptical below, lanceolate or oblong above, 1 to 2 cm. long, serrato-crenate, short petioled, with two subsessile glands at the base; stipules small and subulate; racemes 2 to 4 cm. long, sessile, 10- to 20-flowered; staminate flowers small; bracts bistipulate-glandular; sepals ovate; petals narrow, ciliate; stamens about 10; receptacle pilose; pistillate flowers 1 to 4, at base of raceme, short pedicelled or subsessile; bracts large, deltoid; calyx segments smooth, oblanceolate or linear, equalling or slightly exceeding the capsule; gland strongly 5-lobed; receptacle velutinous; petals mere subulate rudiments; styles 3, biparted; capsule oval, unequally triquetrous, about 4 mm. long; seeds oval, 3 mm. long, strongly biconvex; caruncle large and thickish.—Plate 15.

Specimens examined from Florida (Curtiss no. 2523, Gasparilla Key, in sand, no. 5398, sandy ground near Lake Worth Inlet, no. 5956, dry pine barrens near Hains City; Garber, Sarasota, 1876; Chapman, Punta Pass; Simpson, 1880, Sarasota Bay, no. 391, San Carlos Bay, 1891.

C. glandulosus Lindheimeri Muell. Arg. in DC. Prod. 15^2: 685. 1866; Coulter, Bot. West. Texas 399. 1894.

Low, 2 to 4 dm. high, striae on stems not conspicuous; stellate hairs short and subappressed; lower leaves elliptical or oblong-ovate, 1 to 3 cm. long, upper 1 to 1.5 cm. long; apex obtuse, margins denticulate or serrulate to subentire, puberulent above, grayish-green below.—Plate 16, f. 3.

Specimens examined from Texas (Lindheimer no. 691, Llano; Palmer no. 1244, Wilson Co.; Croft, San Diego, 1884–88; Buckley, Austin, 1882; Nealley, Corpus Christi, 1889; Schott, in Mexican Boundary Survey [no. 1303], 1852).

C. glandulosus Shorti n. var.

Lower leaves oval, equalling the petioles in length, 2 to 5 cm. long, upper ones oblong, the petioles shorter; apex

obtuse or rotund, margins sinuate or serrato-crenate, except the basal margin which is entire; minutely stellate-pubescent below, puberulent above. — In the Engelmann Herbarium, labelled "Croton — Ex Semin. Texen.", on one of Dr. Short's labels with the date added after Kentucky, 1850. — Plate 16, f.1.

C. GLANDULOSUS SIMPSONI n. var.

Stem branching freely, 2 to 3 dm. high, pale, densely pilose, the central hair of each stellate long and at right angles to the stem, the lateral appressed; leaves oval to ovate, basal margins serrulate or entire, otherwise coarsely serrato-crenate, tomentose below, 2 to 3.5 cm. long, 1.5 to 3 cm. broad; petioles biglandular at the base of the leaf, 2 to 3 cm. long on the lower leaves, shorter above; raceme sessile, 1 to 2 cm. long, exceeded by the leaves, 10- to 20-flowered, congested; staminate flowers short pedicelled; bracts linear and hirsute; sepals oblong, very thin; petals oblanceolate, ciliate at the base; stamens about 10; receptacle pilose; pistillate flowers nearly sessile; bracts linear; calyx generally subequally 5-parted; sepals linear to oblanceolate; petals short, subulate rudiments or obsolete; styles 3, biparted, 1 to 2 mm. long; capsule globose, 5 to 6 mm. tall, pilose; seeds about 4 mm. long, punctulate; caruncle large.

Collected by Simpson, dry rocky soil, Cocoanut Grove, Florida, 1892.

C. GLANDULOSUS SEPTENTRIONALIS Muell. Arg. in DC. Prod. 15²: 686. 1866; Coulter, Bot. West. Texas 399. 1894. *C. glandulosus* of American authors. *Geiseleria glandulosa* Klotzsch, in Wiegmann, Archiv für Naturgeschichte 7: 254. 1841.

Slender annual, 4 to 16 dm. high; stems pale, stellate-hirsute, the central hair 1 mm. or more long, the lateral hairs shorter and somewhat appressed; lower leaves oval to oblong-ovate, 3 to 5 cm. long, upper ones lanceolate or

narrowly oblong, 3 to 6 cm. long, 5 to 20 mm. broad, coarsely serrate, the serratures often somewhat dentate, base and apex obtuse with two stipitate, saucer-shaped glands at the base; petioles 1 to 2 cm. long; raceme 1 to 3 cm. long, the 2 to several pistillate flowers clustered at the base; calyx 5-parted; petals represented by subulate processes; styles 3, biparted; capsule subglobose, 4 mm. tall, trigastric, stellate; seeds oval, 3 to 4 mm. long, punctulate; calyx accrescent, nearly equalling the capsule at maturity; staminate flowers congested, short pedicelled; bracts narrowly oblong and minutely glandular at the base (see fig. 1, 2, pl. 17); calyx 5- (4- to 6-) divided, the sepals oblong ovate; petals narrowly oblong; stamens 6 to 11.—Plate 17.

Specimens examined from Florida (Chapman; Nash, no. 579; Curtiss, nos. 2523, 4273, 4933, 5683; Simpson, 1890; Hitchcock, 1894; Webber, no. 504; Palmer, no. 490, Indian river, 1874, has more appressed pubescence and resembles the species very closely); Alabama (Buckley, 1841; McCarthy, 1888; Earle and Baker, no. 11); Mississippi (Skehan, 1895; Tracy, nos. 2889, 2890, 3440, 4726; Pollard, no. 1102); Louisiana (Hale, no. 471; Frank, 1837); Tennessee (Kearney, 1894); Georgia (LeConte; Grosvener, 1864; Small, 1893); South Carolina (Coville, no. 124; Ravenel, 1869); North Carolina (Hymans, 1880; McCarthy, 1885; Kelly, 1891; Small, 1894; Gray and Carey, 1841); Virginia (Heller, no. 1153); Illinois (Geyer, 1842; Bebb, 1861; Vasey; Patterson; Seymour, 1886); Iowa (Reppert; Hitchcock, 1889; Pammel); Kansas (Kellerman, 1888; Hitchcock, no. 994; McKenzie, 1895); Missouri (Engelmann, 1870; Pech, 1861; Eggert, 1878, 1893; Letterman, 1882; Dewart, 1892; Bush, no. 123; 1892; 1893; Dean; Trelease, 1890, 1897; Savage and Steele, 1897); Arkansas (Engelmann, no. 6, 1835; Nuttall; Pitcher); Indian Territory (Palmer, no. 308*a*; Bush, no. 551); Oklahoma (Oliver, no. 116); Texas (Lindheimer, no. 691*b*; Palmer, no. 2056; Ness, 1897; Buckley, 1882; Pammel, 1888; Heller, no. 4150; Ferguson, 1895 and 1899); and the following of uncertain locality: James, "Source of the Canadian"; Bigelow in Whipple's Expedition, 1853–4; Wright, no. 273 or 638.

A form, reported as "Common below the Navy Yard, Philadelphia" (Diffenbough, 1864; Martindale, 1865; and Parker, 1866, 1867, "On ballast ground"), is *C. glandulosus scordioides* (Lam.) Muell. Arg. Also collected at Mobile, Alabama, by Dr. Mohr.

C. GLANDULOSUS CRENATIFOLIUS n. var.

Leaves crenate or serrato-crenulate, elongated oblong,

about 3 cm. long, 5 to 10 mm. wide, sparsely stellate; stem very slender.

Specimens examined from Florida (Simpson, no. 391, San Carlos Bay, 1890; Blodgett, Charlotts . . . . and Pine Key; Henderson; Hitchcock, 1890).

C. GLANDULOSUS ANGUSTIFOLIUS Muell. Arg. in DC. Prod. **15**^{2}: 696. 1866; Coulter, Bot. West. Texas 399. 1894.

Stems slender, stellate pubescence appressed; lower leaves linear-lanceolate, remotely and obtusely serrate, glabrate above, puberulent below, 5 to 7 cm. long; the petioles 2 to 3 cm. long; stipules subulate; upper leaves linear, 4 to 5 cm. long, 4 to 7 mm. broad. — Plate 16, f. 2.

Specimens examined from Texas (Drummond, nos. 241, 334; Lindheimer, no. 172, 1843, and at Houston, 1842; Thurrow, 1890; Hall, no. 571, Giddings); and, doubtfully included here, Frank "in regionibus fluminis Mississippi", 1837; Vesterland, Orange Co., Florida, 1889.

c. Annual; calyx of the short pedicelled, capitate or racemose pistillate flowers 3- to 8-parted and accrescent; margins of the leaves entire or nearly so; tomentum very dense and close, velvety.

1. Calyx very slightly unequally 6- to 8-cleft; styles twice or more bicleft.

C. CAPITATUS Michx. Fl. Bor. Am. **2**: 214. 1803; Geiseler, Crot. Monog. 66. 1807; Wood, Class Book Bot. 631. 1865; Muell. Arg. in DC. Prod. **15**^{2}: 687. 1866; Gray, Man. Bot. 391. ed. 1857; Coulter, Bot. West. Texas 399. 1894; Chapman, Fl. South. U. S. 430. 1897 [3d ed.]. *Pilinophytum capitatum* Klotzsch, in Wiegmann, Archiv für Naturgeschichte **7**: 255. 1841. *Heptallon graveolens* Rafinesque, Neogenyton 1. 1860. Ex Muell. Arg.

Annual, erect, 3 to 8 dm. high, approximately branched above; leaves oval below, oblong to elongated-oblong above, 2 to 5 cm. long, entire, apex obtuse and mucronulate, base rotund, rarely cordate, sometimes minutely biglandular; lower side of the leaves, petioles and branches densely stellate-tomentose; upper side velutinous and

darker; petioles of lower leaves as long as, or slightly longer than the leaves; upper ones shorter; stipules subulate or obsolete; staminate flowers short pedicelled; bracts filiform and branched; sepals equal, oval, densely stellate; petals 5, narrow, ciliate; stamens 7 to 12, slightly exserted; filaments short ciliate; pistillate flowers generally clustered at the base of the short (1 to 3 cm. long), raceme, densely soft woolly with a purplish tinge; stellates long stalked or stipitate in the inflorescence, subsessile or short pedicelled elsewhere; calyx unequally 6- to 8-parted, the sepals oblanceolate or oblong; petals none; disc orbicular, glandless or glands rudimentary; styles 3, 2 to 3 times bicleft, 5 to 6 mm. long; capsule globose, 7 to 9 mm. long, densely tomentose, slightly exceeded by the accrescent woolly sepals; seeds orbicular, strongly biconvex, 5 mm. long; caruncle small, stipitate. — Plate 18.

Specimens examined from New Jersey (Knisken, 1846); Illinois (Vasey, 1860; Seymour, 1880; M. B. W. 1887; Hall, 1861; Buckley, 1838; Williams, 1879; Vasey; French; Bebb, 1860); Kentucky (Short, 1831, 1835); Missouri (Frank, 1835; Bush, nos. 122, 335, 372; Dewart, no. 60; Letterman, 1880; Buttler, no. 87; Blankinship, 1887; Pammel, 1886; Trelease, 1897; Engelmann; Burgess); Arkansas (Nuttall; Pitcher; Rolfs, 1891); Louisiana (Hale; Holloway); Tennessee (Fendler; Ward, 1877; Gattinger = Curtiss, no. 2524; Bain, no. 215); Texas (Lindheimer, no. 304; Thurber, no. 288; Reverchon, 1874; Buckley, 1882; Lomas, 1897); Oklahoma (De Barr, no. 280); Indian Territory (Palmer, 1863, no. 309 in 1868; Burrill; Butler, 1877; Ward, no. 11, in part; Carleton, no. 502; Bush, no. 553); Kansas (Popenoe, 1873; Bodin, 1887; Smythe, no. 327; Waugh, 1892; Norton, 1892; Gayle, no. 545); Iowa (Parry; Rolfs; Hitchcock, 1887, 1889); Alabama (Baker, no. 2; Mohr); North Carolina (Biltmore herb., no. 3740).

C. ENGELMANNI n. n. *Pilinophytum Lindheimeri* Engelm. and Gray, Pl. Lind. 24. 1845 (Boston Jour. Nat. Hist. **5**:232); *C. capitatus Lindheimeri* Muell. Arg. in DC. Prod. **15**^{2}:687. 1866; Coulter, Bot. West. Texas 399. 1894. *C. Lindheimeri* Wood, Class Book Bot. 631. ed. 1865; Young, Fl. Texas 485. 1873.

Annual, erect, 5 to 20 dm. high, much branched, umbel-

lately or approximately so above, finely and densely stellate-tomentose throughout; lower leaves 1 to 2 dm. long, the petioles about as long; upper leaves 4 to 12 cm. long and short petioled, lanceolate, acuminate, mucronate, entire or unevenly serrulate, base rotund, but generally becoming cordate; stipules setaceous, 4 to 6 mm. long, covered with stipitate stellates; raceme 5 to 15 cm. long, interrupted, oblong or pyramidal, loosely woolly and with a distinct yellowish tinge, the stellates long stipitate; staminate flowers on pedicels 5 mm. long; stamens 9 to 12; filaments stellate-ciliate at base; petals oblanceolate, ciliate; sepals ovate, acute; pistillate flowers usually 3 on the lower part of the raceme, not clustered at its base; pedicels short; bracts like the stipules or branched; calyx densely woolly, 7- to 8-parted, the 3 or 4 outer sepals with very small, acuminate, scale-like glands at their bases; capsule somewhat compressed, 6 to 8 mm. tall, trigastric; styles 3, twice bicleft, 6 to 10 mm. long; seeds oval, 4.5 to 5 mm. long. — Plate 19.

Specimens examined from Georgia (Chapman, and McCarthy, no. 27, 1888, both at Rome); Florida (Curtiss, no. 6498, Pensacola); Alabama (J. D. Smith, 1884; McCarthy, Colera, 1888); Arkansas (Harvey, no. 12); Mississippi (Skehan, 1895; Pollard, nos. 1081, 1270; Tracy, nos. 4723, 4727); Louisiana (Hale, Gregg, 1847; Daves, 1889; Leavenworth; Carpenter, no. 23; Tracy, no 3461; Langlois, no. xx, 1884); Texas (Drummond, nos. 224, 258; Lindheimer, nos. 60, 171, 239; Gregg; Wright; Hall, no. 372; Parry, no. 829½; Wurzlow, no. 51; Crawford, nos. 11, 14; Buckley, 1882; Thurrow, 1890; Palmer, no. 1238; Ness, 1896; Mohr, 1892; Ferguson, 1895, 1899). Also cultivated in St. Louis from Texas plantlets obtained through the kindness of Prof. Ness; cultivated specimens of Engelmann and Hall.

C. Engelmanni albinoides n. var.

Similar to the preceding but larger, stouter and more branched; lower leaves broadly ovate; upper leaves much longer, ovate-lanceolate, and cordate; pubescence white, never yellowish or purplish, finer and more appressed than in the two preceding forms. — Growing with the species,

but intermediate forms have not been observed. — Southwest Texas and northward.

Specimens examined from Texas (Havard, nos. 4 and 5; Heller, no. 1800; Wooton, no. 227; Pringle, no. 2073; Ferguson, several collections in 1899); Indian Territory (Ward. no. 11, in part).

C. Muellerii Coulter, Bot. West. Texas 399. 1894. *C. Berlandieri* Muell. Arg. in Linnaea **34**: 141. 1865; DC. Prodr. **15**^{2}: 688. 1866. *Heptallon aromaticum* Rafinesque, Neogenyton 1. 1860. Ex Muell. Arg.

Perennial (?), 8 to 12 dm. high, the entire plant covered with a very fine stellate tomentum; leaves ovate to lanceolate, entire, acuminate; base obtuse, 3 to 6 cm. long, 8 to 15 mm. broad; tomentum appressed, fine; petioles 1 to 2 cm. long; stipules about 3 mm. long; racemes oblong, 2 to 3 cm. long, not capitate, tomentose but not loose woolly; staminate flowers small, short pedicelled; sepals ovate; petals ovate and ciliate at their base; stamens about 10, the filaments and receptacle pilose; pistillate flowers subsessile or short pedicelled; calyx unequally 6- to 7-parted; petals none; gland disc-shaped but very unequally lobed; styles 3, twice bicleft or palmately 4-cleft, about 2 mm. long; capsule globose, slightly depressed at the apex, trisulcate, about 4 mm. tall; seeds oval, about 3.5 mm. long. — Found in Mexico near the border and possibly occurs in our territory. — Specimens examined collected by Berlandier, nos. 861, 2281, Llano de Santa Teresa, Matamoros to San Fernando, 1830. — Plate 20.

C. Elliottii Chapman, Fl. South. U. S. 407. 1860; Muell. Arg. in DC. Prod. **15**^{2}: 688. 1866. *C. ellipticum* Elliott, Sketch Bot. S. C. and Ga. **2**: 648. 1824. Ex Chapman. — Not Nuttall, which is *C. monanthogynus* Michx.

Annual, slender, probably 4 to 8 dm. high, stem scabrous below, short appressed stellate above, repeatedly and approximately branched; leaves linear, 4 to 5 cm. long below, 2 to 3 cm. above, 4 to 8 mm. wide, entire, apex generally obtuse; base 1- to 3-nerved, cinereous-tomentose below, darker and velutinously short stellate above; petioles 5 to 20 mm. long; raceme 1 to 2 cm. long, tomentose; staminate flowers several, short pedicelled; bracts setaceous; sepals 5, elongated-oblong; petals linear, ciliate; stamens 8 to 10; pistillate flowers subsessile and clustered at base of the raceme; sepals 6 to 7, unequal, loose tomentose; petals none; glands annular, thin or sometimes

rudimentary; styles 3, twice bicleft, 2 to 3 mm. long; capsule globose, 4 to 5 mm. tall, tomentose, equal to or exceeded by the accrescent sepals, the apices of which are semihooded; seeds oval, 3 to 4 mm. long. — Plate 21.

Specimens examined collected by Chapman, Quincy, Florida, 1835.

2. Calyx very unequally 5-cleft, the two inner sepals being much reduced; styles bicleft.

C. LEUCOPHYLLUS Muell. Arg. in Linnaea **34**: 139. 1865; DC. Prod. **15**^{2}: 681. 1866; Coulter, Bot. West. Texas 399. 1894.*

Annual, 3 to 5 dm. high, di- or trichotomous, densely stellate-tomentose, white or yellowish; stipules about 1 mm. long; petioles nearly as long as the ovate to oblong-ovate leaves; leaves 2 to 3.5 cm. long, 1 to 2 cm. broad, entire, apex obtuse, base rounded, pale below, darker and scabrous (papillate) above; raceme short, 1 to 2 cm. long, congested; staminate flowers short pedicelled; sepals 5, oval; petals oblong; stamens 8 to 10; pistillate flowers short pedicelled; calyx unequally 5-parted, 3 outer sepals oblong, 2 inner smaller and abruptly subulate; petals none; gland narrow and thin; styles 3, bicleft, 1 to 2 mm. long; capsule subglobose, 4 to 5 mm. tall, trisulcate, depressed at the apex, the tomentose calyx lobes about two-thirds the length of the capsule; seeds oval, 3 to 4 mm. long, thick. — Plate 22.

Specimens examined collected by Berlandier, no. 614 (ex. 2), July 1823; no. 2424, July 1825, Southwest Texas.

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* A Mexican variety of this species may be characterized as follows: —

C. LEUCOPHYLLUS TRISEPALIS n. var.

Annual, 4 to 5 dm. high, densely coarsely stellate-tomentose; leaves ovate to oblong, 2 to 5 cm. long, 1.5 to 3 cm. broad, base rounded, apex obtuse, margins crenato-dentate or entire, densely tomentose, looser and lighter below; petioles stoutish, nearly as long as or longer than the leaves; stipules setaceous, 5 mm. long; raceme 2 to 4 cm. long, congested, with about 5 to 8 pistillate flowers; capsule about 5 mm. tall; equalled by the 3 outer sepals, the inner abortive. — Specimens examined from Monterey, Mexico, collected by Gregg, no. 165, 1848; Pringle no. 2225, 1888.

d. Suffruticose, or low annual; Calyx 5- (rarely less) parted, often accrescent, on long pedicels and often reflexed; ovaries 2- to 3-celled; capsules 1- to 3-seeded.

C. CORYMBULOSUS Engelm. in Torrey, Bot. Wheeler Exped. 242. 1878; Coulter, Bot. West. Texas 397. 1894. *C. Lindheimerianus* Torrey, Bot. U. S. and Mex. Bound. Surv. 194. 1859; Muell. Arg. in DC. Prod. **15**^{2}: 579. 1866. *Oxydectes Lindheimeri* Kuntze, Rev. Gen. Pl. 612. 1891.

Suffruticose, the several erect ligneous stems springing from the root, simple below, somewhat corymbose above, argenteous throughout; leaves broadly oval to oblong, 2 to 4.5 cm. long; apex mucronulate; base rounded; stellate pubescence closely appressed above, slightly looser below; petioles of stem leaves long, one half or more as long as the leaves; stipules subulate to foliaceous, deciduous; inflorescence compact and oval when young, at length becoming loose and corymbulose or cylindrical, 1 to 3 cm. broad, 2 to 4 cm. tall, the peduncle exceptionally elongating to 8 to 10 cm.; unisexual or bisexual, sometimes staminate, sometimes pistillate flowers predominating, or even dioecious forms frequent; staminate flowers on pedicels 4 to 6 mm. long; bracts setaceous, 1 to 2 mm. long; calyx 5-parted, petals spatulate, and densely bearded; stamens 6 to 18, ciliate along their tumid bases, 5 to 8 mm. long, one-half exserted; pistillate flowers on slender pedicels 6 to 12 mm. long at maturity of fruit or exceptionally longer (3 to 6 cm.), spreading or reflexed, apetalous, or subulate rudiments often present; glandular disc 5-lobed; styles 3, biparted, 3 to 8 mm. long, slender; capsule oval or oblong, 4 to 7 mm. tall, the calyx often one third as long; seeds oblong, truncate at both ends; caruncle prominent, stipitate. — Plate 23.

Specimens examined from Texas (Wright, 1848, no. 641, 1849; Buckley, 1883; Gregg, nos. 71, 288; Duffy, 1860; Jones, no. 4201; Letterman, no. 57; Girard, 1880; Nealley, nos. 367 = 455, 795 = 455, 459 = 462 in part; Reverchon, no. 134, in Eng. Herb. = Curtiss, no. 2525*d*; Boyd;

Havard, 1883, no. 32, "on T. P. R. R.", a very large-leaved form with an unusually developed raceme of only pistillate flowers, 12 cm. long, pedicels 4 to 6 cm. long, but not reflexed); New Mexico (Rothrock, no. 506; Rusby, no. 375; Vasey, no. 452, 1881; Mearns, no. 152; Mulford, nos. 616, 761, 948; Wright, no. 1805); Arizona (Rothrock, 1874; Pringle, 1884; Lemmon, no. 461; Palmer, no. 242; Wilcox, no. 276; McDougal, no. 793; Schott and Parry, 1852); Mexico (Palmer, no. 1245, in Coahuila; Hartman, no. 806, in Chihuahua; Thurber, no. 337, in Sonora and no. 706, in Chihuahua, "Common on sandy plains from Gila to Rio Grande").

C. LINDHEIMERIANUS Scheele, in Linnaea **25**: 580. 1852; Coulter, Bot. West. Texas 399. 1894; Small, in Britton and Brown, Ill. Fl. U. S. and Can. **3**: 518. *f.* *2292a*. 1898. *C. ellipticus* Muell. Arg. in DC. Prod. **15**^{2}: 688. 1866. *C. eutrigynus* A. Gray, Man. Bot. 438. 1867. *Oxydectes elliptica* Kuntze, Rev. Gen. Pl. 611. 1891.

Annual, 3 to 5 dm. high, 2- to 4-chotomous, appressed pubescent throughout, greenish, incanous only on younger branchlets; leaves oval or rhomboid-elliptical, 1 to 3 cm. long, somewhat oblong above, apex shortly rounded, sometimes retuse, base truncate or cordate, entire or undulate, cinereous below; petioles about as long as the leaves; staminate flowers in short few-flowered racemes; pedicels 3 to 4 mm. long; bracts setaceous; sepals generally ovate; petals 5, clavate, densely ciliate; glands thin; stamens 7 to 12, the filaments nearly smooth; receptacle pilose; pistillate flowers solitary or in twos or threes from the base of the raceme, apparently from the forks as in *C. monanthogynus*, very rarely racemose as in *C. corymbulosus*, long pedicelled, 5 to 15 mm. at maturity, becoming pendent; sepals 5, subequal, concave, obovate or lanceolate; petals none or only rudiments; glandular disc thin, lobed; styles 3, biparted, about 3 mm. long; capsule oval or cylindrical, 4 to 5 mm. long, truncate or obtuse at both ends, 3-celled and generally containing 3 oblong, punctulate seeds; caruncle large, stipitate; calyx lobes more or less accrescent, becoming

oblanceolate, one half to two thirds as long as the capsule. — On sandy soils. — Plate 24.

Specimens examined from Kansas (Hitchcock, no. 991, in sandy soil, Harper Co.); Indian Territory (Palmer, nos. 307, 308, "Between Ft. Cobb and Ft. Arbuckle; Sheldon, no. 301; Butler, no. 6 (?), 1877); Oklahoma (Oliver, no. 117); Texas (Berlandier, nos. 649, 2059; Lindheimer, no. 526; Reverchon = Curtiss, no. 2525*a*, no. 871; Buckley, 1875; Wright, "dist. 575," 1849; Ness, 1893; Palmer, no. 1241; Croft, no. 25; Havard; Nealley, no. 225 = 457, no. 459 = 457; Ferguson, 1899); Mexico (Wilkinson, 1885).

C. MONANTHOGYNUS Michx. Fl. Bor. Am. **2**: 215. 1803; Geiseler, Crot. Monog. 68. 1807; Adr. Jussieu, Tent. Euphorb. 30. 1824; A. Gray, Man. Bot. 392. 1857; Chapman, Fl. South. U. S. 408. 1860; Young, Fl. Texas 485. 1873; Wood, Class Book Bot. 631. 1881; Coulter, Bot. West. Texas 400. 1894; Small, in Britton and Brown, Ill. Fl. U. S. and Can. **2**: 363. *f.* *2292*. 1897. *C. tomentosus* Schecut, Fl. Carol. 471. 1806. *C. ellipticus* Nuttall, Gen. N. A. **2**: 225. 1818; Wood, Class Book Bot. 489. 1847; Darby, Bot. South. U. S. 499. 1855. *Argothamnia herbacea* Sprengel, Syst. Veg. **3**: 848. 1826. *Engelmannia Nuttalliana* Klotzsch, in Wiegmann, Archiv für Naturgeschichte **7**: 253. 1841. *Gynamblosis monanthogyna* Torrey, in Marcy, Expl. Red River 282. 1854; U. S. and Mex. Bound. Surv. 196. 1859. *Angelandra elliptica* Baillon, Etude Gen. Euphorb. 379. 1858. *Oxydectes monanthogyna* Kuntze, Rev. Gen. Pl. 612. 1891.

Low annual, 3 to 5 dm. high, repeatedly 2- to 4-chotomous, whitish or sometimes rusty-stellate throughout, at length papillate; lower leaves long petioled, orbicular; upper leaves ovate to oblong-ovate, entire, generally obtuse and mucronate, 1 to 4 (to 6) cm. long, cinereous below; petioles about one half the length of the leaves; racemes very short, about 1 cm. long; staminate flowers on bracteate pedicels 2 mm. long; calyx of 3 to 5 ovate sepals;

petals clavate, ciliate; pistillate flowers 1 to 4, from the base of the staminate raceme (apparently from the forks), pedicels 2 to 3.5 mm. long, becoming reflexed; sepals 5, oblong, about 1 mm. long; disc glandular; ovary 2-celled, puberulent; styles 2, biparted, short, 1.5 mm. long; capsule oval to ovate, 3 to 4 mm. long, 1-seeded by abortion of one of the ovules; seeds strongly biconvex, 3 to 3.5 mm. long.—Common on rocky hills and waste places, Iowa to Georgia and Texas and Mexico.

Specimens examined from Iowa (Burgess, 1879); Illinois (Buckley, no. 25; Vasey; Engelmann, 1860; Holton, 1844): Kentucky (Short, 1831, 1835); Missouri (Riehl, no. 106; Engelmann, 1834, 1842; Bush, 1888, 1890, nos. 336, 336*a*, 353, 879; Burgess, 1883; Glatfelter, 1895; Pammel, 1886; Fritchey; Dewart, 1892; Trelease, 1895, and several collections in 1897); Kansas (Carleton, nos. 180, 491; Shear, no. 166; Clothier, 1892; Stevens; Norton, 1892, no. 483; Hitchcock, 1892; Hall, 1869); Oklahoma (Waugh, 1893); Indian Territory (Butler, no. 1, in part, 1877; Palmer, 1863; Bush, no. 552); Arkansas (Nuttall; Harvey, no. 67; Beyrich, 1834; Pitcher; Trelease, 1897; Engelmann, no. 457); Mississippi (Pollard, no. 1311, 1896); Tennessee (Gattinger, "Curtiss, 2525," 1878; Curtiss, 1875; Robinson, no. 54; Bicknell, 1894); Georgia (Canby, Stone Mt., 1876; Small, 1895); Alabama (Buckley, 1821); Louisiana (Hale); Florida (Chapman); Texas (Lomas, no. 1, 1897; Drummond, 1833; Lindheimer, nos. 527, 692; Buckley, 1882; Heller, no. 1932; Reverchon, 1874; Palmer, no. 1243; Pammel, 1888; Wurzlow, no. 50; Jermy; Wright; Bigelow, 1852; Riddell, no. 7; Hall, no. 573); Texas and Mexico (Berlandier, nos. 441, 442, 946, 1762, 2376, 2532, in 1828–34. Pringle, no. 1913, Monterey, 1888).

III. Pistillate and staminate flowers apetalous; calyx 5-parted, never accrescent; dioecious, or sometimes monoecious in *C. punctatus*; stipules obsolete.

A. Suffruticose or perennial; branches scurfy, whitish.

a. Staminate racemes rarely exceeding 3 cm. in length.

C. PUNCTATUS Jacquin, Coll. ad Bot. Chem. et Hist. Nat. **1**: 166. 1786; Icon. Plant. Rar. **3**: 19. *t. 621*. 1789. *C. maritimus* Walter, Flor. Carol. 239. 1788, and most later writers. *C. disjunctiflorus* Michx. Flor. Bor. Am. **2**: 215. 1803. *C. Plukenetii* Vahl, in Geisel. Crot. Monog. 40. 1807. Ex Muell. Arg. *Drepadenium maritimum* Rafinesque, Neogenyton **2**.

1860. *Hendecandra maritima* Klotzsch, in Wiegmann, Archiv für Naturgeschichte **7**: 252. 1841. *Gynamblosis maritima* Baillon, Etud. Gen. Euphorb. 372. 1858. — Not *C. punctatus* Loureiro, Flor. Cochin China 518. 1790; nor Coulter, Bot. West. Texas 397. 1894, which is *C. argyranthemus* Michx.

Perennial, diffuse, .5 to 1 m. high, di- or trichotomous; branches and inflorescence cinereous or rusty-tomentose; leaves elliptical, oblong, ovate; apex obtuse or acute; base truncate or cordate; entire or undulate; 1 to 5 cm. long; whitish, densely puberulent above; densely stellate-scaly, tomentose beneath; petioles one half to as long as the leaves; stipules obsolete; monoecious or dioecious; staminate raceme simple or branched, few to several flowered, interrupted and generally short, 1 to 2 cm. long, the lower part naked; pedicels 2 to 4 mm. long; bracts narrow and exceedingly deciduous; 5 to 6 subequal deltoid sepals; petals none or rudimentary; glands oval and scale-like; stamens about 12, barely exserted; filaments ciliate; pistillate raceme short, about 1 cm. long, with 1 to 3 sessile flowers; bracts deltoid; calyx parted into 5 equal, oblong or cuneate sepals; petals none; gland annular; styles 3, 3- to 4-parted, 1 to 2 mm. long; capsule subglobose, depressed, 5 to 8 mm. long, 6 to 11 mm. broad, trigastric; calyx not accrescent; seeds about 6 mm. long, dark or variegated; caruncle large, substipitate. — Common along the south Atlantic and Gulf coasts from North Carolina to Venezuela.— Plate 25.

Specimens examined as follows: Canby, 1867; McCarthy; Biltmore herb, 2117*a*; Hymans, 1876; Coville, no. 148, "about 25 miles from Wilmington, annual or perennial, a globular bush about one and a half feet high;" LeConte; M. A. Curtis, Sandy sea coast of N. C. 1845; Grosvenor, 1864; Chapman; Curtiss, 1875, nos. 2519, 5532; Garber, 1877; Simpson, 1889; Nash, no. 2438; Reynolds, 1875; Keeler, 1870–76; Webber, nos. 229, 486; Dean; J. D. Smith, 1882; Palmer, nos. 486, 1237; Underwood, 1896; Tracy, 1891, no. 4724; Frank, 1835; Buckley, 1882; Lindheimer, 1842; Wright; Robbins; Bodin, no. 67; Nealley, no. 58 = 458; Heller, no. 1423; Berlandier, 3213; Gregg, no. 3; Liebmann,

1841; Schott, 1851, no. 309 in 1865; no. 6 in 1867 and in Yucatan; Hitchcock, in Jamaica, 1890.

C. CALIFORNICUS Muell. Arg. in DC. Prod. **15**^{2}: 691. 1866; Watson, Proc. Am. Acad. Arts and Sci. **24**: 297. 1879; Bot. Cal. **2**: 69. incl. var. *major*. 1880; Greene, Flor. Francis. 89. 1891; Bot. Reg. San Francisco Bay 79. 1894; Coulter, Bot. West. Texas 400. 1894. *Hendecandra procumbens* Eschsch. [Mem. Acad. Petersb. **10**: 287. 1826], Linnaea, **3**: 150. 1828; Klotzsch, in Wiegmann, Archiv für Naturgeschichte **7**: 252. 1841; Baillon, Etude Gen. Euphorb. 372. 1858; Hook. and Arn. Bot. Beech. Voyage 389. *pl. 91*. 1841. *Croton procumbens* Torrey (in part), Bot. Mex. Bound. Surv. 195. 1859, and in Phanerog. Pac. N. A. (Wilkes Exped.) 453. 1874. Exclusive syn. Kunth; Watson, Bot. Geol. Expl. Exped. Fortieth Parall. (King's Exped.). 320. 1871. *Oxydectes Californica* Kuntze, Rev. Gen. Pl. 611. 1891.

Procumbent or ascending, 4 to 12 dm. high, suffruticose or fruticose in protected regions, sometimes caespitose, dichotomous; branches slender, cinereous throughout with a dense appressed sub-scaly scurf; petioles slender, 2 to 3.5 cm. long; stipules obsolete; leaves generally oblong, 2.5 to 5 cm. long, 8 to 18 mm. wide, sometimes elliptical-ovate, or obovate, base obtuse or narrowed, entire, 3- to 5-nerved, midvein prominent; silvery or green above; dioecious; staminate plants more slender and shorter branched; racemes simple, short, 2 to 3 cm. long, nude at base; flowers about 3 mm. broad, on slender pedicels 4 to 6 mm. long, soon deciduous; calyx of 5 ovate sepals; no petals; glands 5; oblong; stamens 12 to 15, barely exceeding the sepals; filaments ciliate; pistillate raceme 3 cm. long or less, mostly 2- to 3-flowered; bracts small; calyx of 5 ovate, obtuse sepals, no petals; glandular disc entire; styles 3, short, 2 to 2.5 mm. long, flat or terete, palmately 3- to 5-cleft or twice bicleft or bifid; capsule 3-celled, variable

in size, depending on number of seeds developed, in general 5 to 6 mm. tall, 6 to 7 mm. broad, depressed at apex, trigastric; seeds oval or globose, 4 to 5.5 mm. long, black or cinereous-variegated; caruncle prominent, triangular or reniform. — Plate 26.

Specimens examined from vicinity of San Francisco (Chamisso; Bolander, no. 2454, Capt. Wilkes' Expl. Exped.; Brandegee, 1885; Kellogg and Harford, nos. 236 and 900; Michener and Bioletti, no. 352*a*; Jones, no. 2383; Douglass); Santa Barbara and Monterey (Hartweg, 1949; Nuttall; Rich; Torrey, no. 479; Schott; Vasey, 1875; Rothrock, no. 113; Coulter, no. 666); other California localities (Vasey, no. 580, San Bernardino; Peckham, San Buenaventura, 1866, Ojai and vicinity, 1866; Brewer, no. 28, Los Angeles; Parry, San Diego to Monterey, 1850; Palmer, no. 444, southern part of San Diego Co. 1875; Eastwood, Brentwood, 1893; Eastwood (?), Saugus, Los Angeles Co.; Parish, no. 4448, Oceanside, San Bernardino, 1894; Anger, no. 191, Dd. Man. Alt. 1000 ft.; Orcutt, Smith Mt., 1882; Jones, 3030, Pasadena; Pringle, Wilmington, 1882: — the last two very close to var. *tenuis*).

C. Californicus tenuis n. comb. *C. tenuis* Watson, Proc. Am. Acad. Arts and Sci. **14**: 297. 1879; Bot. Cal. **2**: 69. 1880.

Low shrub, 3 to 7 dm. high, erect, branches very slender, densely scaly-stellate; leaves narrowly oblong to lanceolate, 2 to 4.5 cm. long, .5 to 1 cm. wide, entire, cinereous above, lighter and with a more metallic luster below; petioles short, 5 to 10 mm. long, less than half the length of the leaves; dioecious; staminate racemes simple, 1 to 3 cm. long, nude below, 5- to 20-flowered above, flowers small, about 2 mm. broad, on pedicels 3 mm. long, pentamerous, sepals ovate, petals none, stamens 10 to 12; pistillate flowers few, generally maturing only 1 or 2; styles very short; capsule trigastric, depressed, about 4 to 5 mm. tall; seeds oval to oblong, 3 to 4 mm. long; caruncle large. — Plate 27, f. 1.

Specimens examined from California (Cleveland, Potrero, 1876, no. 836, San Luis Rey, 1882; in Nat. Herb., San Diego; A. Gray, San Diego; Newhall, 1885; K. C. Newhall, 1883; Snyder, San Diego, 1894; Nevin, Los Angeles, 1878 and 1881. Insensibly passing into more erect and shrubby forms with slightly larger leaves, greener above: Parish,

vicinity of San Bernardino, alt. 1000–2500 ft., 1897; no. 3223; Whitewater, 1894; S. B. and W. F. Parish, no. 8, San Bernardino, 1881; Coville and Funston, no. 32, between San Bernardino and Redlands, alt. 300 m., no. 39, south slope of the San Bernardino Mts., alt. 650 m.; Henshaw, no. 118, Santa Ysabel; Lemmon, nos. 50, 51, 53); Sonora (Pringle, valley of the Alta river, 1884); Arizona (Pringle, sand washes of the Rilleta, 1881, with oblong seeds).

C. CALIFORNICUS LONGIPES n. comb. *C. longipes* Jones, Proc. Cal. Acad. Sci. n. s. **5**: 721. 1895.

Shrubby at base, erect or ascending, 3 to 7 dm. high, dichotomous, freely branching from the lower portion of older stems, branches closely covered with strongly fringed scales; leaves ovate, elliptical or oblong, rounded or short cuneate at base, apex rounded, frequently apiculate, 2 to 4 cm. long, 1 to 2 cm. wide, grayish below, thinly stellate and generally green above; petioles rather long (1 to 2 cm.), one third to one half as long as the leaves; staminate racemes 2 to 3 cm. long; pedicels slender, 5 to 6 mm. long, bracts small or obsolete; flowers about 3 mm. broad; glands large, oval; stamens 10 to 13; filaments slightly ciliate; pistillate racemes about 2 cm. long, 5 to 8 flowers, on pedicels about 2 mm. long; bracts almost as long, calyx lobes broadly ovate, about 1 to 1.5 mm. long; capsule globose, about 5 mm. tall; seed elliptical, thick, 4 mm. long; caruncle oblong, large for the seed. "Abounds in sandy places, especially on drifting sand dunes in the valley of the Virgen and southward." Jones, l. c. — Plate 27, f. 2, 3.

Specimens examined from Utah (Jones, 5213, Leeds, Alt. 3500 ft.; no. 5024 *au*, Copper mine, Beaverdam Mts. (Utah?), no. 5149 *au*, Silver Reef, all in 1894; Palmer, St. George, 1875; Johnson, 1875). California (Fritchey, Arrow Head Springs, 1891; Orcutt, no. 1260).

C. CALIFORNICUS MOHAVENSIS n. var.

Low, 5 to 7 dm. high, much branched shrub, the typical forms characterized by their small oval to oblong leaves, .5 to 2 cm. long, 3 to 12 mm. wide, densely stellate-pubes-

cent on both sides; white beneath, slightly darker above; petioles 3 to 7 mm. long; staminate racemes short, 1 to 2 mm. long, .5 cm. of the base generally being nude; pedicels 2 mm. or less long; flowers 2 to 3 mm. broad, sepals ovate; stamens 6 to 10; pistillate racemes short, 1- to 3-flowered; styles 3, very short (1 to 1.5 mm. long), twice bicleft; capsule globose, small, about 3 mm. tall. — Intergrades with var. *longipes* and var. *tenuis*.

Specimens examined from California (Cooper, Soda Lake, Ft. Mohave, 1860–61, one of the forms included in *C. tenuis* by Watson; Eastwood, "Between Rose Sta. and Adobe Sta.; between Bakersfield and Tejon Pass, Kern Co., 1894." Common on the desert. "These plants are erect but with the branches curving inward at the top so that the effect of the whole is brushy, like a tumble-weed somewhat, or like *Eriogonum nidularium*, on a large scale, or like the Rose of Jericho;" Orcutt? in M. B. G. Herb; Emory, Colorado Desert, 1846; Schott, III., no. 5, Diluvial banks of the Colorado del Oeste, 1855; LeConte, Southern Cal.; S. B. and W. F. Parish, no. 1236, on the desert at Whitewater, 1882); Arizona (Palmer, no. 2, 1869, and one credited to N. Arizona, 1869; Lemmon, no. 236, Camp Lowell, 1880; Dr. Swart, no. 37, Verde river, 1866); Nevada (Bailey, no. 1918, Valley of the Virgen River, Lincoln Co.).

b. Staminate raceme usually 4 cm. or more long.

C. NEO-MEXICANUS Muell. Arg. Linnaea **34**: 141. 1865; DC. Prod. **15**^{2}: 690. 1866; Coulter, Bot. West. Texas 400. 1894. *C. procumbens* Torrey, Bot. Mex. Bound. Surv. 195. 1859. — In part. *Oxydectes Neomexicanus* Kuntze, Rev. Gen. Plant. 612. 1891.

Suffruticose, several erect stems from a woody base, 3 to 16 dm. high, slender, dichotomous; stems, branches, lower side of leaves, and inflorescence densely covered with deeply radiate scales, the entire plant argenteous except the upper sides of the leaves which are generally green, not so scaly; leaves entire, narrowly oblong, lanceolate or elliptical, 1 to 4 cm. long, 5 to 15 mm. broad; petioles short, one fourth to half the length of the leaves; stipules obsolete; dioecious; staminate racemes 4 to 8 cm. long or longer, base nude, many flowered; bracts short, narrow; pedicels 3 to 4 mm. long; calyx equally 5-cleft, the sepals

lanceolate, thin; petals none, glands large; stamens 10 to 12, the filaments ciliate; pistillate racemes short, 2 to 3 cm. long, 1- to 3- or several-flowered; pedicels short, one fourth the length of the mature capsules; bracts small, broadly ovate; sepals ovate-oblong, obtuse; petals none; gland annular; styles 3, short, 1 to 1.5 mm. long, palmately 3- to 4-cleft; capsules globose, trigastric, 1- to 3-seeded, 5 to 6 mm. broad; seeds oval, 4 to 5 mm. long; caruncle stipitate, oblong. —Intergrades with *C. gracilis* Kunth, of central Mexico.— Plate 28.

Specimens examined from New Mexico (Thurber, no. 129. 1852; Pope, Junction of Delaware creek and Pecos river, 1855; Mulford, no. 102; Mearns, no. 158, Grant Co.; Wooton, no. 228, Las Cruces; Wright, nos. 1800, 1801, in 1852); Texas (Wright, no. 642; El Paso; Bigelow and Parry, Frontera; Schott, higher locations between Eagle Pass and the Pecos, 1852; Croft, no. 205, 212, San Diego; Buckley, 1882; Duffy, Ft. Stockton, 1860; Havard, no. 34, Colorado City; Nealley, no. 391 = 459, Ballinger, and no. 460 = 463, Chenate; Sweedy, Tom Green Co.; Reverchon, no. 875 = "Curtiss, no. 2525*d*," Rocky hills and plains on the Colorado River, Kimble and Taylor counties; Pope; Bigelow, dry arroyo, opposite Presido del Norte, 1852, with staminate racemes 21 cm. long and linear leaves, is possibly a variety; Nealley, no. 460, Chenate, is quite similar. A very small oval-leaved form collected "on heights near the Pecos," is possibly a variety); Mexico (Thurber, no. 810, Chihuahua; Berlandier, no. 3211, Nuevo Leon; Gregg, nos. 31, 59 and 375, Saltillo, no. 54, Buena Vista. From Dr. Gregg's notes we learn that the bark of the root is used by the inhabitants as a purgative).

B. Annual.

C. Texensis (Klotzsch) Muell. Arg. in DC. Prod. 15²: 692. 1866; Engelmann, Bot. Wheeler Exped. 243. 1878; Coulter, Synop. Flor. Colorado 126. 1874; Man. Bot. Rocky Mt. Reg. 325. 1885; Bot. West. Texas 400. 1894; Chapman, Suppl. Fl. South. U. S. 648. 1883; S. Watson in A. Gray, Man. Bot. 459. 1890; Small in Britton and Brown, Ill. Flor. U. S. and Can. **2**: 363. *f. 2293*. 1897. *C. muricatus*, Nuttall in Trans. Am. Phil. Soc. n. s. **5**: 173. 1837; Torrey, Bot. U. S. and Mex. Bound. Surv. 195. 1859. *Hendecandra Texensis* Klotzsch in Wiegmann, Archiv für

Naturgeschichte 7 : 252. 1841; Engelm. and Gray, Boston Jour. Nat. Hist. 5 : 261. 1845; Torrey in Marcy, Expl. Red River 282. 1854; *Hendecandra ? multiflora* Torrey in Fremont's First Rept. 96. 1843. *Oxydectes Texensis* Kuntze, Rev. Gen. Plant. 613. 1891.

Annual, erect, slender, 4 to 16 dm. high, di- to trichotomous, stellate; stellates simple, the radiating hairs 10 to 15 in one series, more or less deciduous; leaves linear, lanceolate or oblong, 4 to 12 cm. long, .5 to 5 cm. broad, apex obtuse, acute or sometimes long acuminate, base rounded to obtuse, entire; stipules obsolete; petioles about 1 cm. long, seldom exceeding 2 cm.; staminate plant very slender, with longer internodes and narrower leaves; staminate flowers in short racemes, 1 to 3 cm. long, simple or rarely branched; bracts setaceous; flowers small, pedicels 4 to 5 mm. long; sepals thin; petals none; glands oval; stamens 8 to 12; filaments ciliate; pistillate flowers in short racemes of 1 to 4 or rarely more flowers; bracts setaceous to subfoliaceous; sepals deltoid; gland annular, sometimes lobed; styles about 2 to 3 mm. long, twice or more bicleft; stigmas 12 to 64; capsule 3-celled, 1- to 3-seeded, oval, 4 to 6 mm. tall, generally muricate; seeds orbicular, 3 to 4 mm. broad; caruncle prominent. — The size, form and degree of pubescence of the leaves are quite variable; otherwise the species is reasonably homogeneous throughout its range. — Plates 29, 30.

Specimens examined from Mexico (Berlandier, nos. 288, 1548; Schott, III, no. 6, Sta. Cruz, Sonora, 1856; South, San Ignatio Los Nogales, Sonora); Texas (Drummond, nos. 256 and II, 266; Lindheimer, nos. 241, 277, 305; Havard, nos. 31, 33; Heller, no. 1863; Thurber, no. 1, 1857; Palmer, no. 1242; Ravenel, 1869; Buckley, 1882; Wright; Letterman, no. 444; Pope; Pammel, 1888; Sallee, 1885; Reverchon, 1874, no. 874, 1882 = Curtiss, no. 2525*b*; Ferguson, 1900); Alabama (Mohr, no. 1, Danville, Talapoosa Co., 1877); Arkansas (Nuttall, Salt River); Missouri (Bush, Jackson Co., 1890; no. 3, Independence, 1886); Illinois (Hall and Harbour, no. 514; Hall, Athens 186–); Iowa (Hitchcock); South Dakota (Rydberg, no. 998; Hot Springs, Black Hills, 1892); Nebraska (Rydberg, 1890; nos.

363, 1430; Wilcox, 1888; Holmes, 1889; Clements, no. 2820; Webber, 1889; Swezey, no. 124; Lanhofer, 1887; Pammel, 1895; H. Engelmann, 1856 and 1858; Mersch, 1843); Wyoming (Nelson, no. 428, Fairbanks; Knowlton, no. 127); Utah (Bishop, 1872, resembles *C. virens*); Colorado (B. Smith, 1869; Redfield, no. 561; Cowen, 1892; Trelease; Tracy and Evans; Knowlton, no. 95; Jones, no. 586; Patterson, 1875; Parry, no. 325; Hall, "*cult*"; Vasey, 1868); Kansas (Sheldon, no. 324; Thompson, nos. 50, 187; Carleton, no. 260; Smythe, no. 121; Bodin, 1888; Redfield, 1872; Reed, 1892; Gurney, 1891; Norton, Dept. Bot. K. A. C., no. 484; Shear, no. 207; McKenzie, 1895); Indian Territory (Bush, no. 554; Palmer, no. 306; Sheldon, no. 272); Oklahoma (Waugh, 1893); New Mexico (Vasey, 1881; Crandall, no. 419; Heller, no. 3813; Rothrock, no. 37; Fendler, nos. 780, 781; Wislizenus, 1846; Jones, no. 4145; Mulford, nos. 1225, 1273, 1309); Arizona (Coues and Palmer, no. 534; Lemmon, nos. 52, 54; Santa Catalina Mts., 1881; no. 55, Chiricahua Mts., 1881; Hoyt, 1892; Mearns, 1884; Lemmon, nos. 284, 577; Pringle, 1881; Hough, no. 38; Parish, no. 240, Lowell; Swart, no. 14; McDougal, no. 536, Verde Valley; Tracy, 1887). Most of the forms in Arizona have very broad leaves, and rather low simple stems.

To the above belong the following of uncertain locations: D. Andrews, California [?]; Stansbury's Exped., July 20, 1850; James, Sources of the Canadian, 1835; Abert, Arkansas river; Emory, Sept. 26, 1846; Bigelow, Pecan Creek, Ft. Smith to Rio Grande, 1853–4; Vasey, no. 524, Rocky Mts. Lat. 40°–41°; Powell's Exped., 1868; Newberry, in McCombe's Exped., 1859; Marcy's Exped. to Red River, 1852; Fremont's First Exped., 1842; Fremont's Third Exped., nos. 146, 176, in 1845.

C. VIRENS Muell Arg. Linnaea **34**: 142. 1865. (Printed *vlrens*); DC. Prod. **15**^{2}: 690. 1866. *Oxydectes virens* Kuntze, Rev. Gen. Plant. 613. 1891.

Annual, very slender, mostly alternately and laterally branched, dichotomous above; branchlets and inflorescence whitish; leaves oblong to lanceolate, obtuse at the ends, 2 to 5 cm. long, 7 to 15 mm. broad, entire; not papillate, glabrous, save for a few silvery stellates, not scales; the pluriserially radiating hairs depressed and persistent (somewhat deciduous in the closely related *C. Texensis*); staminate racemes short, 1 to 3 cm. long, rarely longer, simple or branched, nude below; pedicels slender, 5 to 7 mm. long; sepals small, thin, ovate; no petals; glands small; stamens 10 to 12; filaments subglabrate, exserted one third; pistillate racemes

short, 1- to 4-flowered, generally maturing only one, on pseudo-axillary pedicels 5 to 9 mm. long; calyx pentamerous; petals none; gland annular; styles 3, short, 2 mm. long, twice bicleft or palmately 3- to 4-cleft; capsule trigastric, depressed at apex, 5 to 6 mm. tall, 6 to 8 mm. broad, ochroleucous and coarsely stellate, not muricate, yellowish; seeds oval, 4 to 5 mm. long, subplanoconvex; caruncle small. — Dr. Engelmann considered this to be but a form of *C. Texensis*.* — Plate 31.

Specimens examined from New Mexico (Wright, no. 1799, 1851–2; Vasey, Sucaro, 1881); Mexico (Thurber, no. 760, Sand hills between Corrilitas and El Paso, 1852; Berlandier, no. 1407).

EXPLANATION OF PLATES.

The drawings were made by Mrs. Grace Johnson Vieh and Mrs. M. H. Duffey Irish from herbarium specimens selected by the author, and the details were in most cases drawn from camera sketches made by him. The habit drawings are reduced one half.

Plate 4, *C. Alabamensis*. — 1, 2, 3, Capsule, pistillate and staminate flowers, all × 3.

Plate 5, *C. argyranthemus*. — 1, Staminate flower, × 4; 2, staminate petals, × 6; 3, calyx and capsule, × 4; 4, inner view of a coccus, × 4; 5, seed, × 4; 6, Southwest Texas form.

Plate 6, *C. Berlandieri*. — 1, Staminate flower, × 4, and petals of same, × 6; 2, 3, old and young pistillate flowers, × 4.

Plate 7, *C. fruticulosus*. — 1, Staminate flower, × 4; 2, capsule, × 4; 3, seed, × 6.

Plate 8, *C. Sonorae*. — 1, Staminate flower, × 6; 2, petal, × 6; 3, lower portion of raceme, with pistillate flowers, × 3; 4, seed, × 4.

Plate 9, *C. suaveolens*. — 1, Pistillate calyx, × 6; 2, portion of raceme, with pistillate flowers, × 4; 3, capsule, × 4; 4, seeds, × 4.

Plate 10, *C. Torreyanus*. — 1, Staminate flower, × 6; 2, pistillate flower, × 4; 3, pistillate calyx, × 6; 4, seed, × 5.

Plate 11, *C. Cortesianus*. — 1, Pistillate branch; 2, staminate branch; 3, part of staminate flower, × 4; 4, petal, × 4; 5, pistillate calyx, × 8; 6, young capsule, × 4.

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* Bot. Wheeler Exped. 243. 1878.

Plate 12, *C. linearis*, form *A.* — 1, Staminate branch; 2, pistillate branch; 3, staminate flower, × 8; 4, pistillate flower, × 6; 5, styles, × 6; 6, seed, × 8.

Plate 13, *C. linearis*, form *B.* — 1, Pistillate branch; 2, staminate branch; 3, staminate flower, × 8; 4, pistillate flower, × 6; 5, styles, × 6; 6, seed, × 8.

Plate 14, *C. betulinus.* — 1, Staminate flower, × 8; 2, pistillate calyx, and 3, young capsule of same, × 8.

Plate 15, *C. Floridanus.* — 1, Staminate flower, × 6, and petal of same, × 8; 2, pistillate calyx, × 4; 3, capsule, × 4; 4, seed, × 4.

Plate 16, *C. glandulosus*, vars. — 1, Var. *Shorti*; 2, var. *angustifolius*; 3, var. *Lindheimeri.*

Plate 17, *C. glandulosus septentrionalis.* — 1, 2, Bracts, with glands, × 10; 3, stellate hair, much enlarged; 4, petal and part of calyx, × 8; 5, staminate flower, × 6; 6, portion of capsule and calyx, × 4; 7, seed, × 4.

Plate 18, *C. capitatus.* — 1, Stellate hair from calyx, enlarged; 2, staminate flower with buds above, and sepal, petal and stamen of same, all × 8; 3, pistillate calyx, × 4; 4, capsule, × 4; 5, seed, × 4.

Plate 19, *C. Engelmanni.* — 1, Lower leaf, × ½; 2, staminate flower, × 2, and sepal, petal and stamen of same, × 4; 3, capsule, × 3; 4, pistillate calyx, × 3; 5, styles, × 3; 6, seed, × 4.

Plate 20, *C. Muelleri.* — 1, Staminate flower and sepal, and 2, stamen and petal of same, × 8; 3, seed, × 4; 4, capsule, × 4; 5, pistillate calyx, × 4.

Plate 21, *C. Elliottii.* — 1, Stamen, sepal and petal, × 8; 2, pistillate calyx, × 2; 3, staminate flower, × 8; 4, capsule, × 4; 5, seed, × 4; 6, styles, × 6.

Plate 22, *C. leucophyllus.* — 1, Pistillate calyx, × 4; 2, capsule and bracts, × 4; 3, seed, × 4; 4, sepal, petal and stamen, × 8; 5, style, × 4.

Plate 23, *C. corymbulosus.* — 1, Staminate flower, × 6; 2, petal and stamen from same, × 6; 3, pistillate flower, × 6; 4, capsule, styles removed, × 4.

Plate 24, *C. Lindheimerianus.* — 1, Bract, × 8; 2, sepal and petal, × 8; 3, capsule, × 4; 4, staminate flower, × 6; 5, seed, × 6; 6, rachis, × 4.

Plate 25, *C. punctatus.* — 1, Pistillate plant; 2, monoecious plant.

Plate 26, *C. Californicus.* — 1, Staminate plant; 2, pistillate plant; 3, staminate flower, × 6; 4, capsule, × 4; 5, style, × 4; 6, seeds, × 4.

Plate 27, *C. Californicus*, vars. — 1, Var. *tenuis*; 2 and 3, var. *longipes.*

Plate 28, *C. Neo-Mexicanus.* — 1, Staminate plant; 2, pistillate plant; 3, stellate scales from leaf, much enlarged; 4, staminate flower, × 8; 5, styles, × 4; 6, capsule, × 4; 7, seed, × 4.

Plate 29, *C. Texensis*, narrow leaved form of Southwest. — 1, Pistillate plant; 2, staminate plant; 3, leaf detail, × 10.

Plate 30, *C. Texensis*, broad leaved form of Northwest. — 1, Pistillate plant; 2, staminate plant; 3, staminate flower, × 8; 4, styles, × 4; 5, capsule, × 4; 6, seed, × 4.

Plate 31, *C. virens*. — 1, Portion of leaf showing stellate pubescence, × 10; 2, staminate flower, × 6; 3, capsule and calyx, × 4.

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—— Floridanus, 50, 71. *pl. 15.*
—— fruticulosus, 41, 70. *pl. 7.*
—— glandulosus, (51).
—— —— angustifolius, 53, 71. *pl. 16.*
—— —— crenatifolius, 52.
—— —— fuscescens, (42).
—— —— Lindheimeri, 50, 71. *pl. 16.*
—— —— pallescens, (41).
—— —— scordioides, 52.
—— —— septentrionalis, 51, 71. *pl. 17.*
—— —— Shorti, 50, 71, *pl. 16.*
—— —— Simpsoni, 51.
—— gracilis, 67.
—— hippophaeoides, (46).
—— humilis, (40, 41).
—— leucophyllus, 57, 71. *pl. 22.*
—— —— trisepalis, 57.
—— Lindheimeri, (54).
—— Lindheimerianus, (58), 59, 71. *pl. 24.*
—— linearis, 46, 71. *pl. 12, 13.*
—— longipes, (65).
—— maritimus, (61).
Croton Miquelensis, 49.
—— monanthogynus, 35, 56, 59, 60.
—— Muelleri, 56, 71. *pl. 20.*
—— muricatus, (67).
—— Neo-Mexicanus, 66, 71. *pl. 28.*
—— Plukenetii, (61).
—— Pringlei, (42).
—— procumbens, (63, 66).
—— punctatus, (39), 61, (62), 71. *pl. 25.*
—— Sonorae, 42, 70. *pl. 8.*
—— suaveolens, 43, 70. *pl. 9.*
—— —— oblongifolium, (44).
—— tenuis, (64).
—— Texensis, 34, 67, 69-72. *pl. 29, 30.*
—— tomentosus, (60).
—— Torreyanus, 44, 70. *pl. 10.*
—— trichocarpum, (45).
—— virens, 69, 72. *pl. 31.*

Drepanidium maritimum, (61).

Engelmannia Nuttalliana, (60).
Eriogonum nidularium, 66.

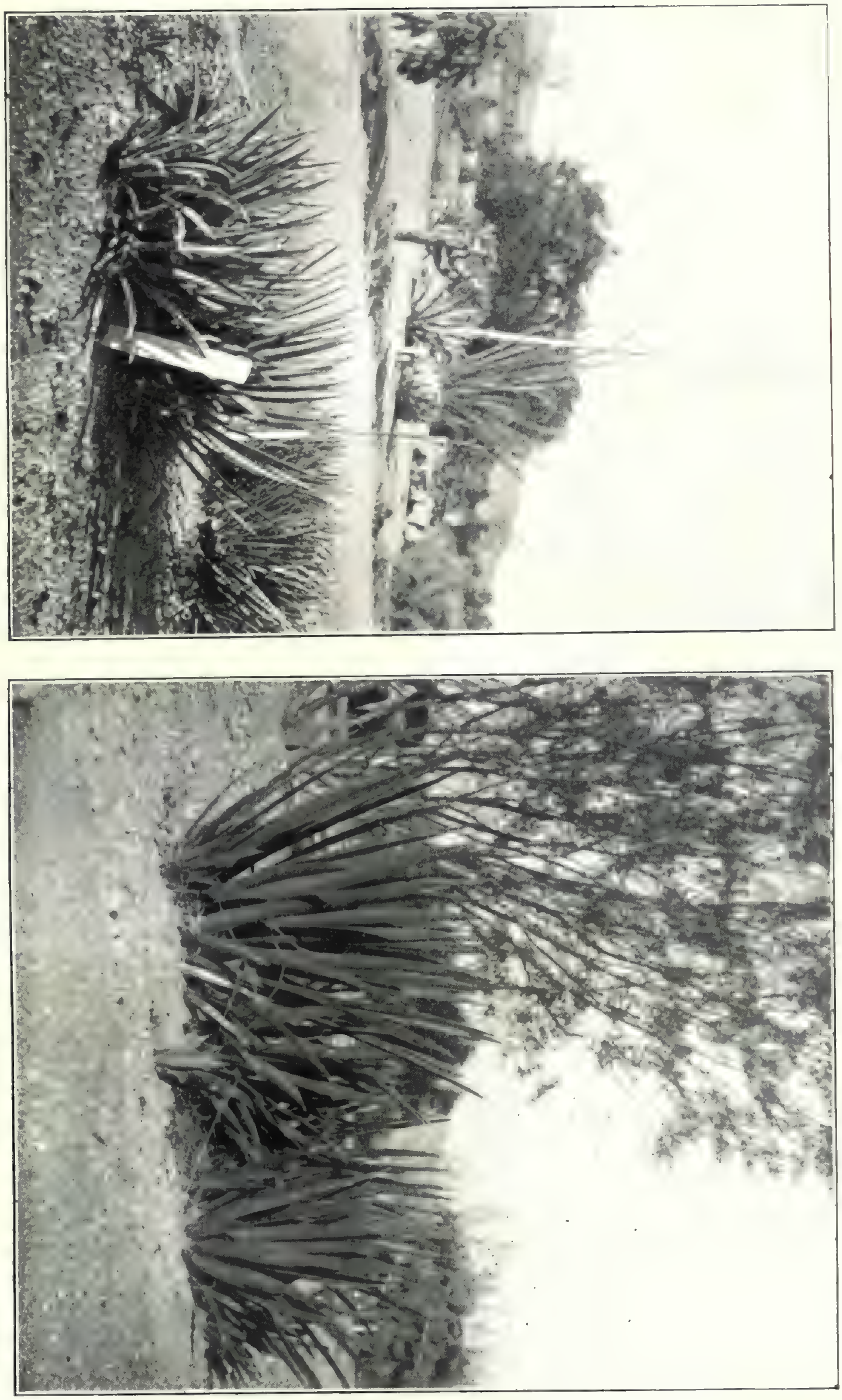
Geiseleria chamaedryfolia, (49).
—— glandulosa, (51).
Gynamblosis maritima, (62).
—— monanthogyna, (60).

Hendecandra maritima, (62).
—— multiflora, (68).
—— procumbens, (63).
—— Texensis, (67).
Heptallon aromaticum, (56).
—— graveolens, (53).

Oxydectes argyranthemus, (39).
—— Berlandieri, (40).
—— Californica, (63).
—— elliptica, (59).
—— fruticulosus, (42).
—— Lindheimeri, (58).
—— monanthogyna, (60).
—— Neomexicanus, (66).
—— Texensis, (68).
—— virens, (69).

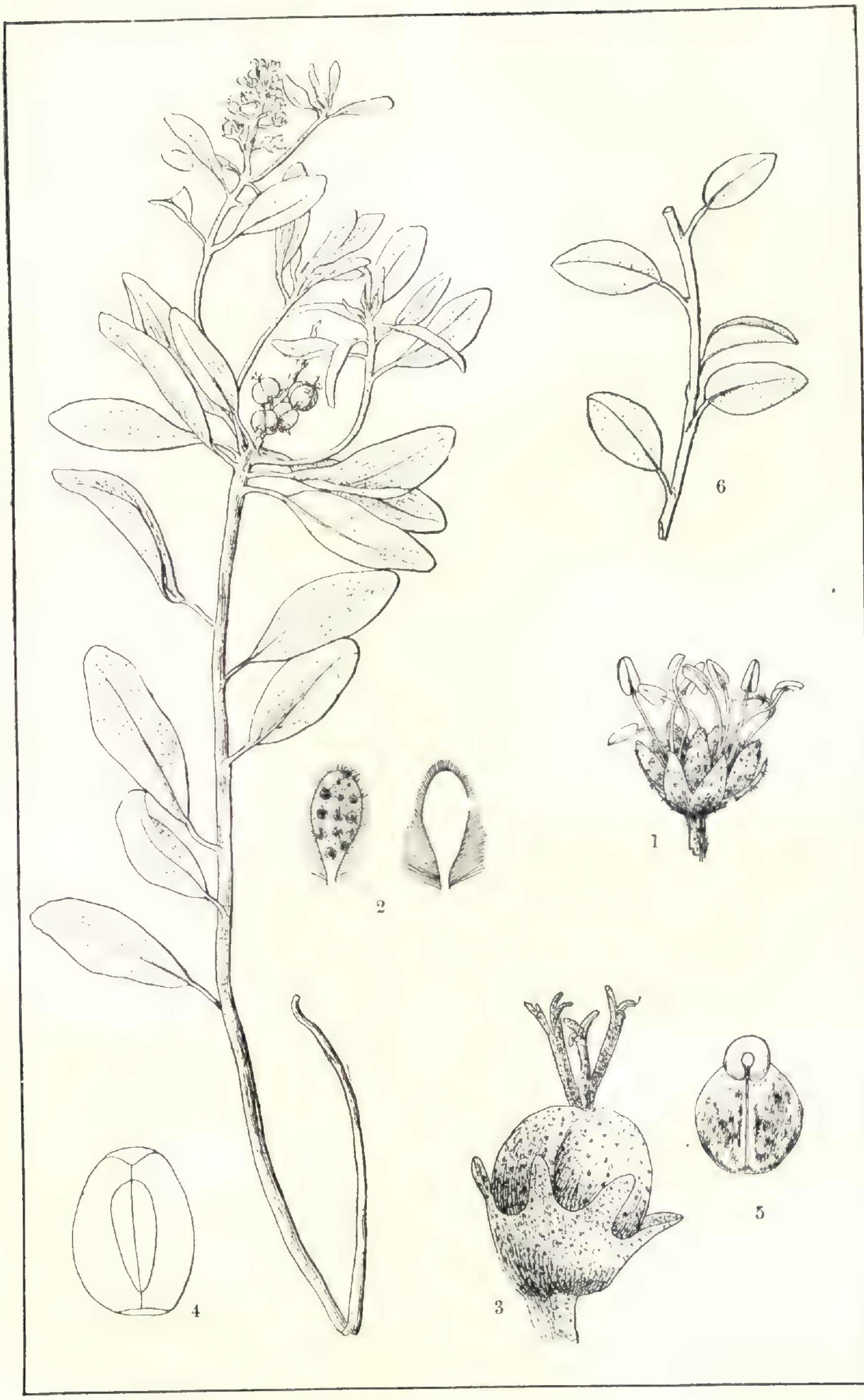
Pilinophytum capitatum, (53).
—— Lindheimeri, (54).

Ricinoides, (33).



AGAVE TRELEASII.

CROTON ALABAMENSIS.



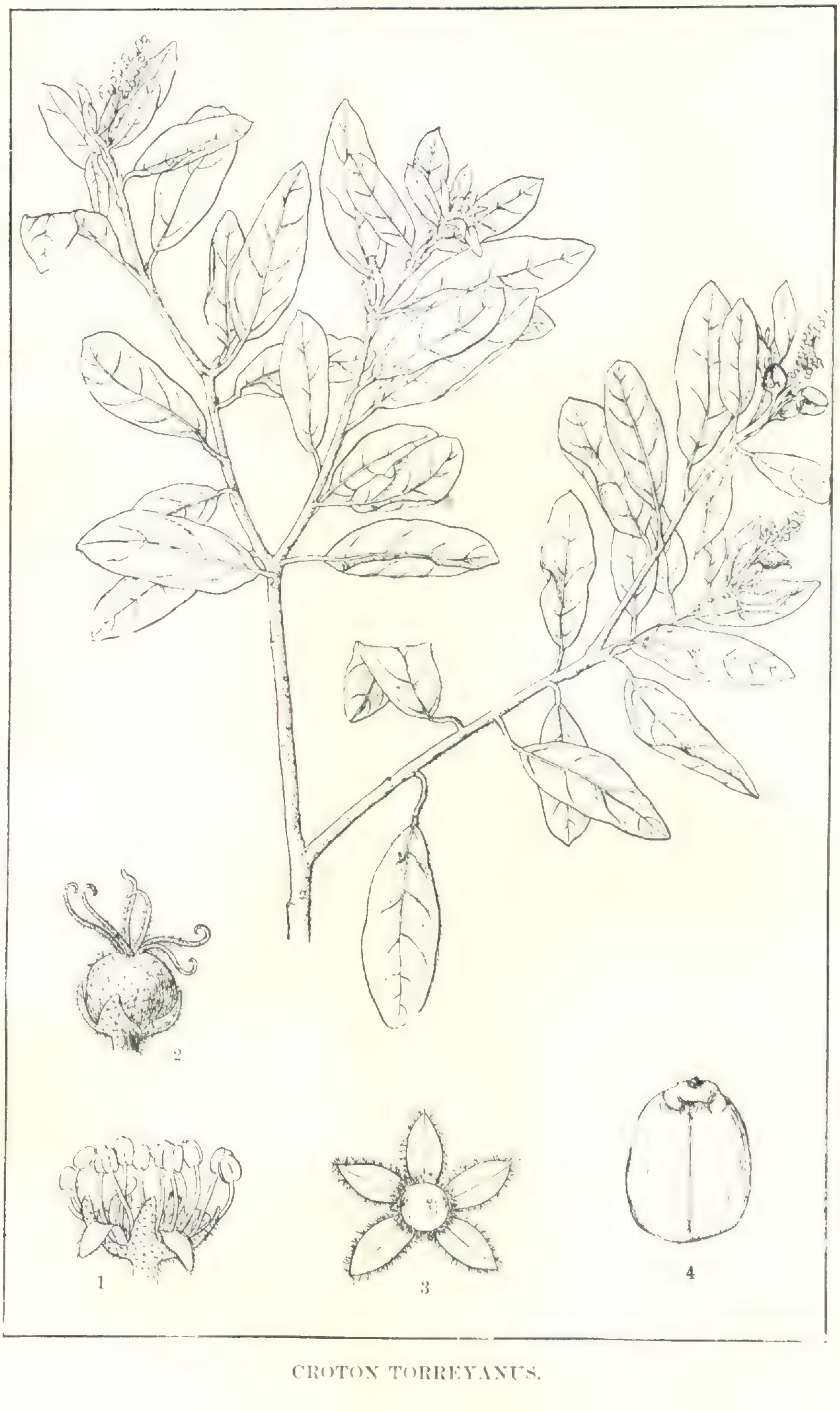
CROTON ARGYRANTHEMUS.

CROTON BERLANDIERI.

CROTON FRUTICULOSUS.

CROTON SONORAE.

CROTON SUAVEOLENS.



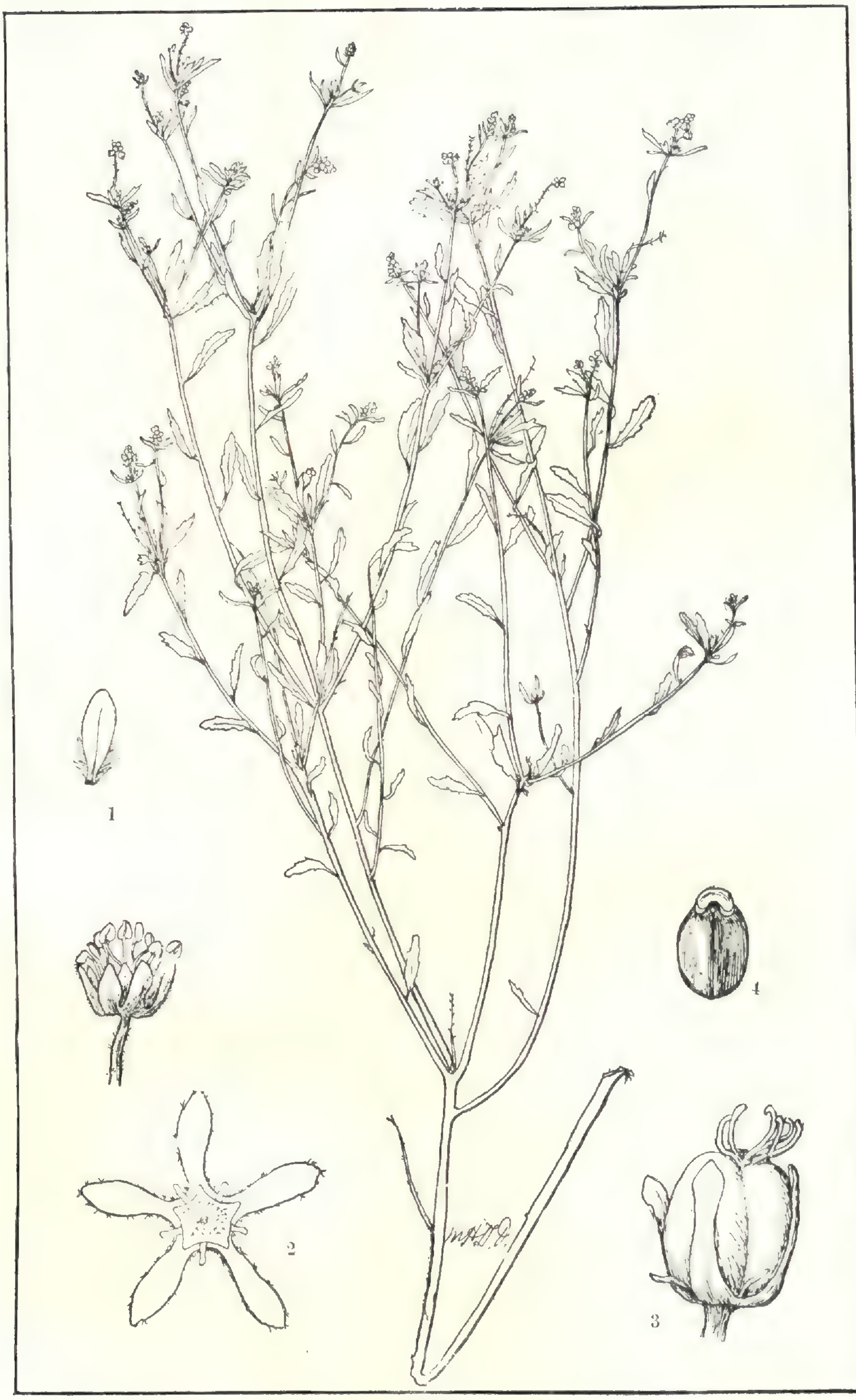
CROTON TORREYANUS.

CROTON CORTESIANUS.

CROTON LINEARIS, FORM A.

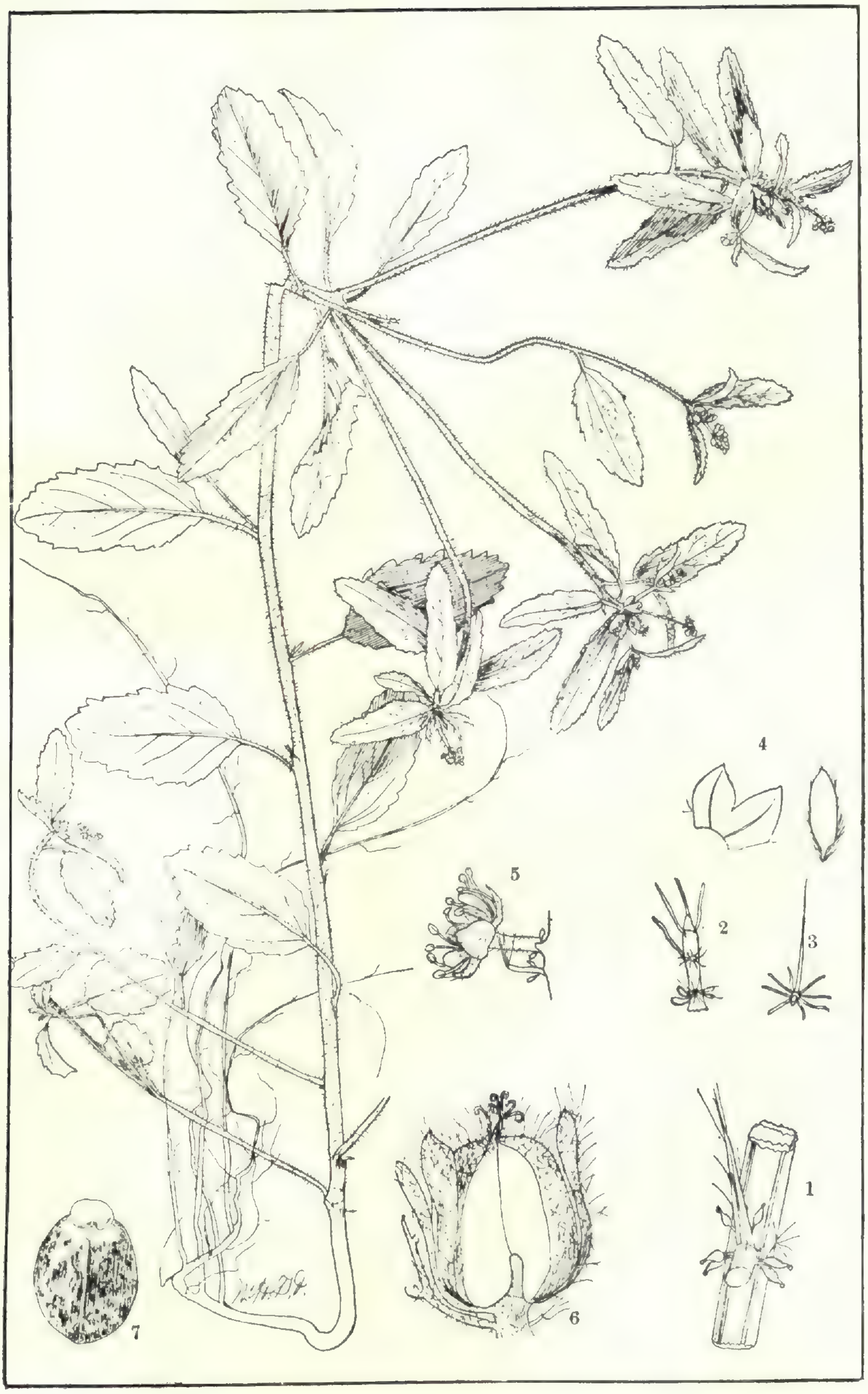
CROTON LINEARIS, FORM B.

CROTON BETULINUS.



CROTON FLORIDANUS.

CROTON GLANDULOSUS, VARIETIES.



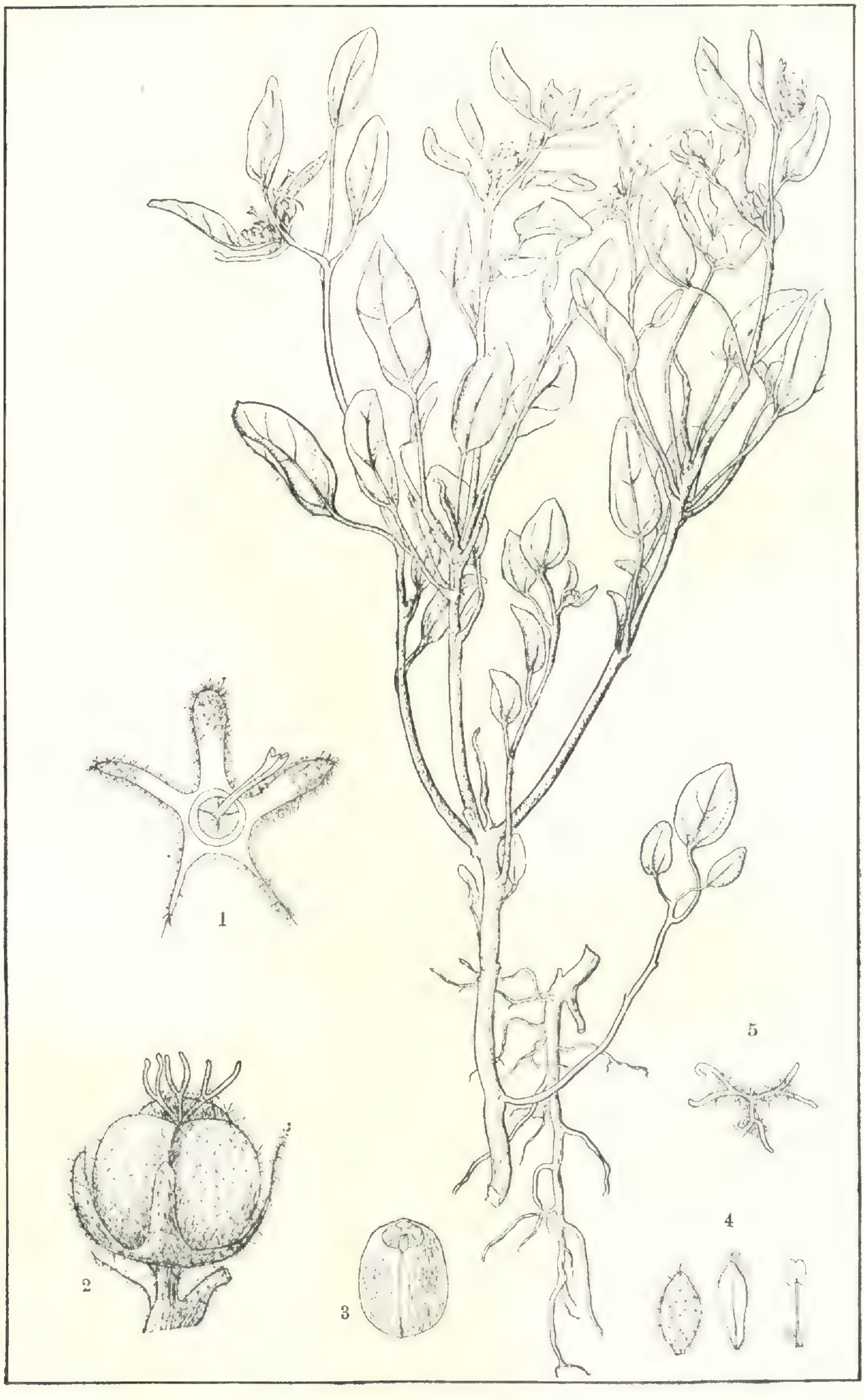
CROTON GLANDULOSUS SEPTENTRIONALIS.

CROTON CAPITATUS.

CROTON ENGELMANNI.

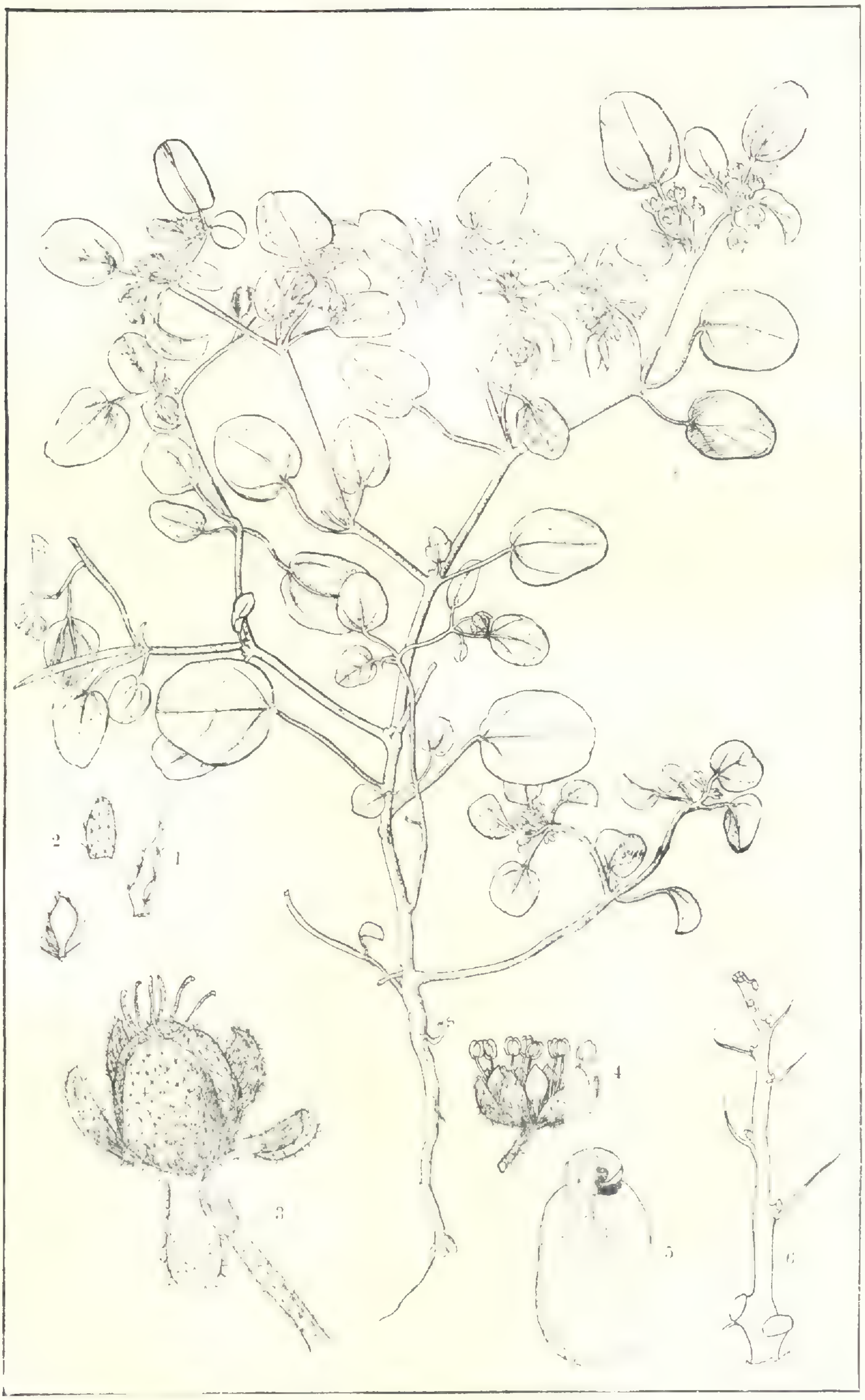
CROTON MUELLERI.

CROTON ELLIOTTII.



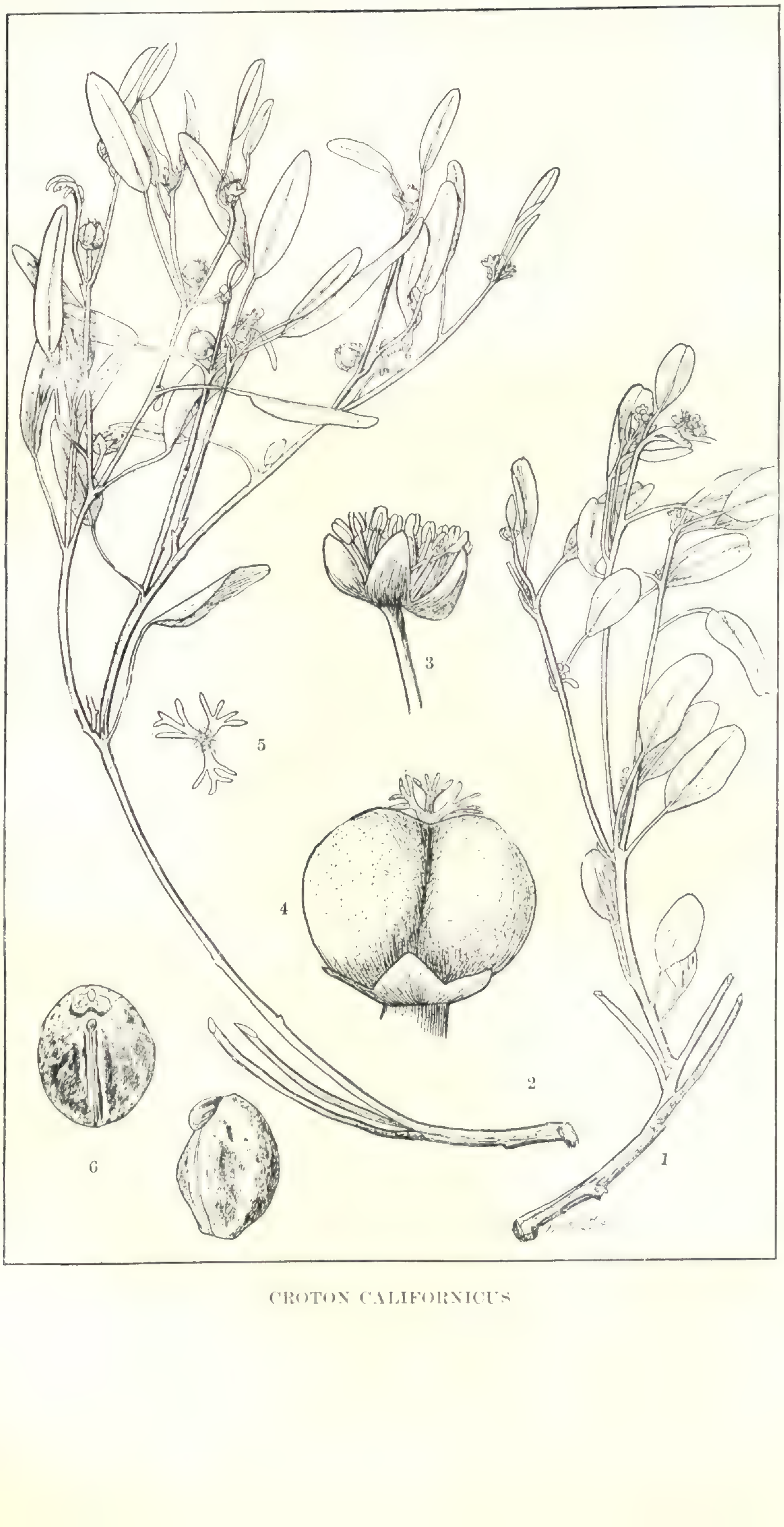
CROTON LEUCOPHYLLUS.

CROTON CORYMBULOSUS.



CROTON LINDHEIMERIANUS.

CROTON PUNCTATUS.



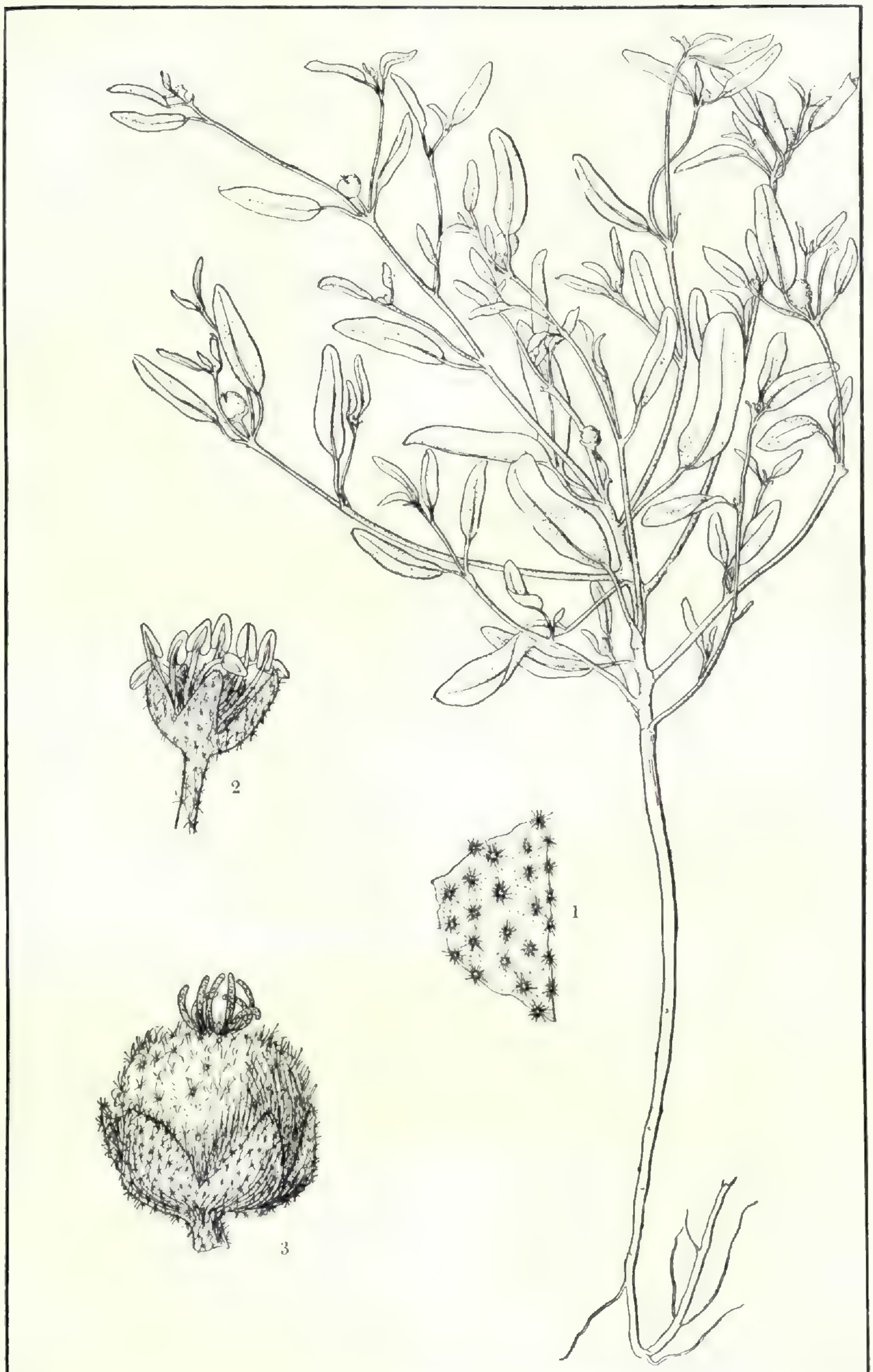
CROTON CALIFORNICUS

CROTON CALIFORNICUS, VARIETIES.

CROTON NEO-MEXICANUS.

CROTON TEXENSIS.

CROTON TEXENSIS



CROTON VIRENS.

AN UNDESCRIBED AGAVE FROM ARIZONA.

BY J. W. TOUMEY.

AGAVE TRELEASII, n. sp. — An acaulescent perennial with short root-stock and fleshy-fibrous roots; leaves 20 to 40 cm. long, 15 to 25 mm. broad, convex on lower and nearly flat on upper side; terminal spine horny, brownish, 12 to 19 mm. long, terete or slightly flattened and grooved on upper side; margin at base membranous (never serrulate), remainder filiferous with several fragile white fibers, not marking with white lines the adjoining leaves in separating in the bud as in allied species; scape 18 to 25 dm. high with moderately slender bracts; inflorescence sub-spicate; flowers usually in twos, sometimes from three to six, yellow, 35 to 50 mm. long and a third to a fourth as wide; perianth lobes short-linear to obovate, curved inward at the apex and on the sides; filaments inserted much above the middle of the tube; ovary twice as long as broad; fruit unknown. — Type specimens in herb. J. W. Toumey. Living co-types in succulent garden University of Arizona; Missouri Botanical Garden, St. Louis; and in garden Department of Agriculture, Washington, D. C.

This well marked species of the Filiferae group of Agave grows on the rocky, southern slopes of the Santa Catalina Mountains in southern Arizona, being found in particular abundance in the type locality on the mountain known as Castle Rock, where two plants were collected by the writer in December, 1896, and planted in the succulent garden at the University of Arizona. These plants have produced numerous offsets and one bloomed in the summer of 1899. Instead of sending up a stipe from the center of the plant, several lateral stipes were produced as offsets, although the central bud was uninjured. These stipes were without leaves at the base, but appeared above the ground as naked stalks sometimes a foot or more from the plant.

The species appears to be most nearly related to *Agave Schottii* but differs from it in many particulars. It is a larger plant in every way, the leaves are nearly twice as

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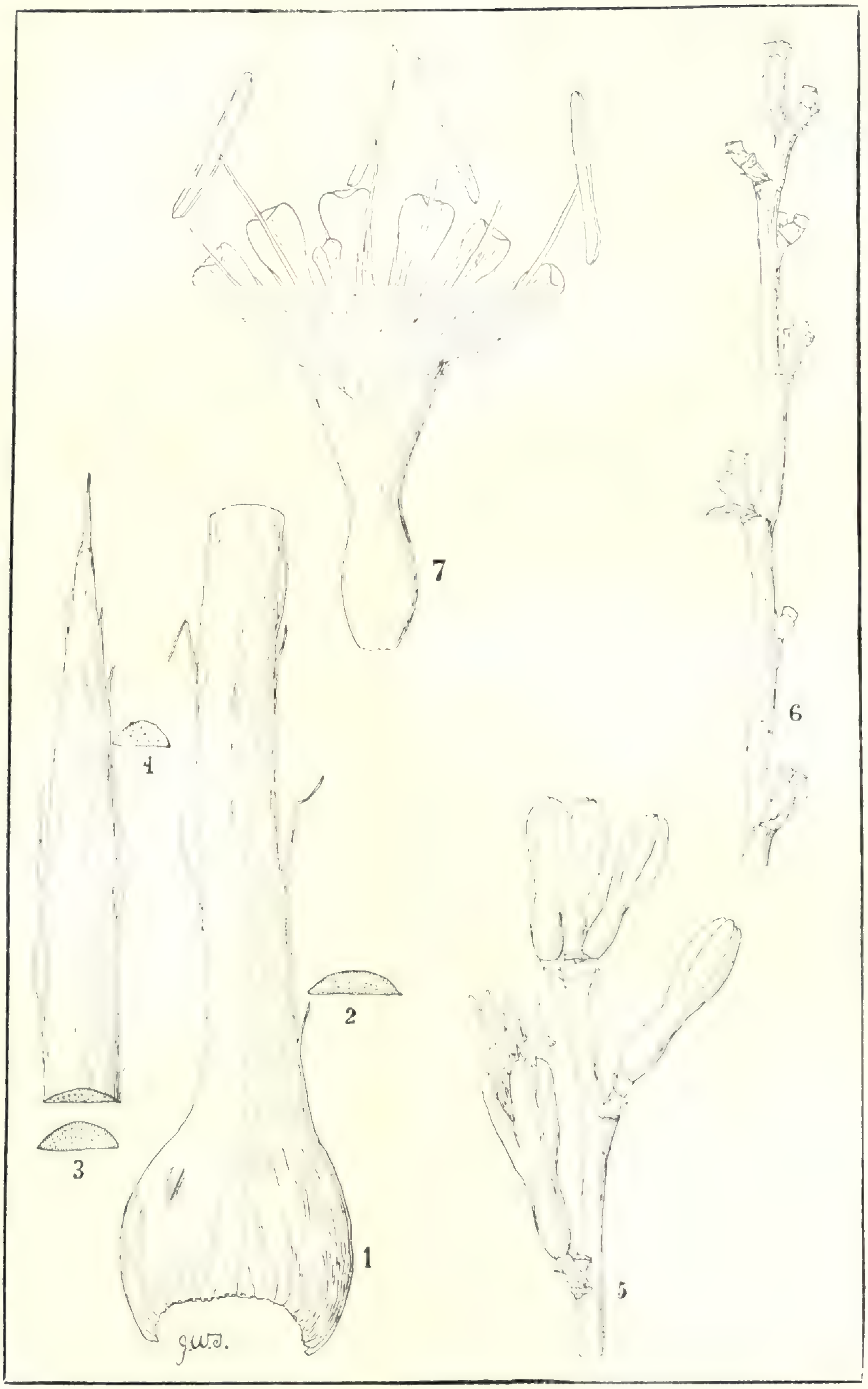
broad, it is deeper green and without markings left by adjoining leaves. The flowers are larger and the stamens are inserted toward the upper part of the tube.

This species, like *Agave Schottii* and *A. Lechuguilla*, has the leaves usually turned to one side. It is one of the Amole plants used by the Mexicans and Indians of the region as a substitute for soap. It grows with *Agave Schottii* at an elevation of about 6,500 feet. I take pleasure in naming this interesting succulent in honor of Dr. Wm. Trelease, Director of the Missouri Botanical Garden.

EXPLANATION OF PLATES.

Plate 32, *Agave Treleasii*. — 1, Medium-sized leaf of mature plant, × ⅜; 2, 3, 4, transverse sections of leaf, × ⅜; 5, terminal portion of inflorescence, × ⅛; 6, terminal portion of scape with flowers removed, × ⅛; 7, flower partially split open, showing the insertion of the filaments, × 1½.

Plate 33, *Agave Treleasii*. — 1, Group of plants in the foreground, the short scape arising as an offset from a mature plant. (Beyond and at the right is a group of *A. Schottii*). 2, Group of plants showing the filiferous leaf-margins and numerous offsets.



AGAVE TRELEASII.

A CRISTATE PELLAEA.

BY WILLIAM TRELEASE.

On the limestone rocks of the Meramec river region in eastern Missouri, *Pellaea atropurpurea* is a very common fern, and although the young fronds are markedly different from the mature fronds and the latter present a considerable range of variation, it is one of the best characterized ferns, as indeed is the case elsewhere in the State and throughout its range. In 1899, however, my attention was called to a plant discovered near Eureka by Mr. Gustavus Pauls, which differs from all forms of this species that I have thus far seen in the remarkable cristate deformity of its fronds, and as Mr. Pauls has since discovered other specimens of the same form, which maintains its characters,— as with the cristates of various other ferns in cultivation,— it appears worthy of a name and may be characterized as follows:—

PELLAEA ATROPURPUREA CRISTATA, n. var.

Habit of the normal form: fronds 6–8 in. high, mostly bipinnate below, nearly all of the pinnae, pinnules and lobes dichotomous, the segments cristately clustered towards the apex of the fronds and their upper lobes.— Plate 34.

Eureka, Mo., on limestone. G. Pauls. 1899.

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PELLAEA ATROPURPUREA CRISTATA.

A PACIFIC-SLOPE PALMETTO.

BY WILLIAM TRELEASE.

While botanizing in the vicinity of Ures, the former capital of the Mexican State of Sonora, in August, 1900, my attention was attracted by a scattering forest of a graceful palm with most beautifully glaucous foliage, nearly ripe fruit of which shows it to belong to the genus *Sabal*, of which it appears to constitute an undescribed and very distinct species which may be characterized as follows: —

SABAL URESANA, n. sp. Trunk 5 or 10 meters high and upwards of 30 cm. in diameter. Leaves glabrous, very glaucous; petiole stout, concavo-convex, unarmed, about 1 m. long, 2 cm. wide and nearly 1 cm. thick; blade about 1 m. long and wide, multifid, with coarse straw-colored fibers from the sinuses, the center arcuately recurved. Fruit of a single developed carpel, depressed globose, 15 to 20 mm. in diameter, edible, green or when dry dingy brown and somewhat glossy, the mesocarp then cottony; endocarp whitish straw-color, glossy within. Seed polished, dark chestnut-brown, labyrinthiform-rugose, much depressed, 12 × 7 mm. — Plates 35–7.

Sonora, Mexico, in the uplands, a few miles to the north of Ures.

From the two arboreous palmettos of the United States, *S. Uresana* differs markedly in its pale very glaucous foliage, and in the size of its fruit, which is of thrice the diameter of that of *S. Palmetto*, and usually a third larger than in *S. Mexicana*, with the former of which species it agrees in having, so far as I know, but one of the three carpels developed and fertile, while in *S. Mexicana* two or even all three are not infrequently developed.

Considering the extent to which this section of Mexico has been visited by collectors of seeds it would be remarkable if this attractive plant should not prove to be already in cultivation in European gardens, and a leaf of a

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very glaucous *Sabal* which Dr. Franceschi sent me in 1893 from Los Angeles, California, where he found and purchased about twenty small cultivated plants, seems to represent *S. Uresana ;* but I have been unable to connect it with any garden or published name.

In foliage it is somewhat suggestive of two other "blue palms" of the Sonoran region, *Washingtonia* (or *Pritchardia*) *Sonorae* Watson,* and *Erythea armata* Watson,† — from both of which it differs conspicuously in having the petioles without teeth, as well as in the size and shape of its fruit, which is usually broader than long and possesses the basal style and sterile carpel-rudiments, and the depressed seed hollowed below and with the embryo at one side near the top, that characterize the genus *Sabal*.

The species of *Sabal* heretofore described are of the Atlantic region, from the Carolina coast to that of Venezuela, and in the adjacent islands. *S. Mexicana* reaches up into Hidalgo county, Texas, in longitude 98° west. *S. Uresana*, however, occurs twelve degrees further west, and is separated from all of its known congeners by the backbone of the continent, which, in the Sierra Madre range to the east of Sonora, becomes an imposing barrier to the movements of animals, as it appears to be to the dispersal of most plants.

In later geological time, the genus *Sabal*, like *Liriodendron* and other genera now of restricted North American distribution, occurred over much of this continent as well as in Europe, and the probability is that this westernmost of the species now known to exist, is the descendant of species which occurred in the Rocky mountain region in Tertiary time, rather than an offshoot from existing Atlantic species or their immediate ancestors. In fruit characters it shows a closer approach to *S. Mexicana* than to any other species of which I have been able to see the fruit.

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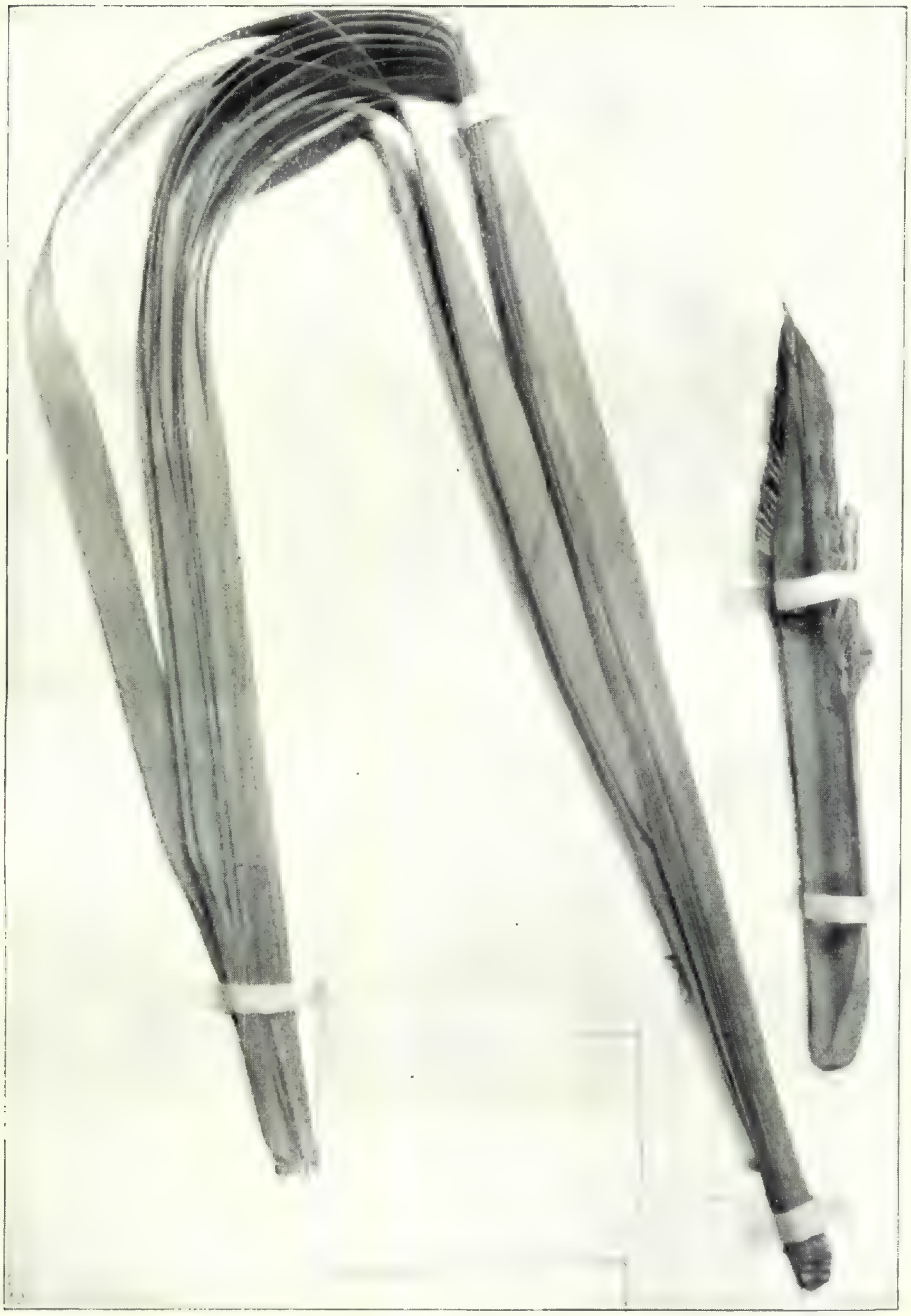
* Proc. Amer. Acad. **24**: 79 (1889). **25**: 136.

† Bot. Calif. **2**: 212, 485.

SABAL URESANA.



SABAL URESANA.

SABAL URESANA.

GARDEN BEANS CULTIVATED AS ESCULENTS.

BY H. C. IRISH.

In entering upon a study of garden beans in 1898, all procurable varieties catalogued by leading seed firms of America and Europe were grown at the Missouri Botanical Garden during that and the two succeeding years. Habit of growth and other varietal characters were carefully noted in the field each year. These, together with the seed characters, have been brought together and classified. The varieties studied are here grouped under five genera which are distinguished from each other mostly by technical characters as follows: —

PHASEOLUS. Plants subglabrous, suberect, dwarf or twining 10–15 ft. Leaves trifoliolate; leaflets entire, broadly ovate, often oblique. Corolla exserted much beyond the calyx; keel prolonged spirally into a long beak; petals unequal; style twisted with the beak, bearded below the stigma, the latter obtuse; stamens diadelphous. Pods not jointed nor constricted between the seeds, the latter with a conspicuous hilum.

DOLICHOS. Petals nearly equal in length; keel narrow and bent at right angles. Otherwise like *Phaseolus*.

VIGNA. Leaflets sometimes slightly lobed. Keel truncated and, in the group to which the species here mentioned belong, shorter than in *Phaseolus*. Pods linear, subterete. Otherwise like *Phaseolus*.

GLYCINE. Plants conspicuously covered with reddish brown hairs throughout. Leaflets large and thin as in *Phaseolus*. Flowers small; corolla slightly exserted beyond the calyx, petals about equal in length; stamens monadelphous. Pods jointed or constricted between the seeds.

VICIA. Plants subglabrous, quite erect, few-branched. Stem and branches quadrangular, more or less striate.

Leaflets 5–7, ovate-elliptical, smooth, abruptly and equally pointed, entire. Flowers white with purplish violet markings. Pods ½–1 in. thick, 3–7 in. long or more. Seed flattened and dented, variously colored.

Linnaeus gave distinct specific names to the climbing and dwarf varieties, as did DeCandolle. The latter also added several names based on the different forms of seed. The strictly dwarf forms easily and freely produce runners under changed conditions, and the forms of seed so completely merge into each other that it does not appear justifiable to separate even botanical varieties on them. At least twenty-five specific names and numerous botanical varieties have been recorded which are evidently synonymous with the different species as I now understand them.

The work of von Martens* is evidently the only effort heretofore made to monograph garden beans. His work is confined to the genus *Phaseolus*, all forms known to him being grouped under seven species and 120 botanical varieties, exclusive of the "fire beans" (*Phaseolus multiflorus* and its four botanical varieties). In 1882 and 1883, Wing† described many forms as grown at Geneva, N. Y., during those years, and devised a scheme for classifying the varieties of *Phaseolus vulgaris*. A few varieties of *Dolichos*, *Vigna* and *Glycine* are also briefly noted.

Phaseolus vulgaris and *P. multiflorus* have never been found wild, but the best authorities generally concede them to be native of South America though formerly supposed to have been wild in Southern Asia. *P. lunatus macrocarpus* has been found wild in Brazil. *Dolichos sesquipedalis* is a native of the West Indies and Tropical America, *D. Lablab* of India, *Vigna* and *Glycine* of Japan, and *Vicia Faba* of Africa, the latter being one of the oldest vegetables in cultivation.

The classification of varieties is based primarily on the form of seed, which appears as constant as color or plant

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* Geo. von Martens, Die Gartenbohnen. (1860).

† Rept. N. Y. Exp. Sta. **1**: 89–119. (1882). — **2**: 235–259. (1883).

habit or perhaps more so. Seedsmen and gardeners almost invariably separate them into dwarf and climbing, which is certainly the most convenient for their purposes. It appears quite evident, however, that varieties most closely related are the ones most nearly alike in form of seed.

Poorly defined and variable forms are not always easily determined by a key. For example, it is necessary to give absolute and proportional dimensions of the seed or pods which are intended for average specimens, but it should be understood that varying individuals commonly occur which go beyond the defined limits.

In selecting names for the garden varieties, the principles for the nomenclature of cultivated plants adopted by the Vegetable Committee of Experiment Station Horticulturists* and the Madison Botanical Congress† have in the main been followed.

Beans are often classed according to their uses, namely, *string* or *snap* in reference to the young or green pods; *shell beans*, when the seed is used in the green state but large enough to shell; and the *ripe seed*. Again there are the green podded and the wax or yellow podded sorts. All pods are more or less green at first but those known as wax podded sorts change to a yellowish color when of edible size, and in the descriptions of varieties where reference is made to the color of pods it is understood to mean those of edible size. The wax pods are, as a rule, less stringy than the green pods but are also less hardy and somewhat more subject to disease, and in the selection of varieties therefore both should be chosen. Among the best green podded sorts for snaps may be mentioned Valentine, Refugee, Sion House, White Flageolet, Cream, Stringless, Canadian Wonder and Mohawk, and of the wax sorts, Black Wax, Golden Wax, Davis, Currie, Yosemite, Wardwell and Detroit. These are also good as shell beans,

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* Bailey, Annals of Horticulture 106–107. (1893).

† Proceedings of the Madison Botanical Congress 41. (1893).

and the white ones, together with the Navy, for the ripe seed. The Limas are perhaps the best of all for shell, Burpee as dwarf and Dreer as climber.

The varieties of *Phaseolus lunatus*, *Dolichos Lablab*, *Vigna Catjang*, *Glycine hispida* and *Vicia Faba* are employed only as shell or ripe beans, *Phaseolus vulgaris* and *P. multiflorus* as either snap, shell or ripe, and *Dolichos sesquipedalis* only as a snap. As a rule only white beans are used in the ripe state in the United States, the color of others being objectionable, and probably more of the Navy variety are thus consumed than any other, especially in this country. In Mexico, the brownish colored varieties are most commonly cultivated.

Beans form one of the leading canning products, large quantities of them being annually produced for this purpose in all parts of the country. They are cooked and served in a great variety of ways. The string beans are commonly served in thickened milk after having been boiled in water and seasoned with pepper and salt. They are often pickled along with cauliflower, cucumbers and other vegetables, or preserved in brine, and when wanted are soaked in water for some time before cooking. Shell beans are treated in a similar manner. The ripe seed is boiled and baked after having been soaked in water for an hour or more, the exact method varying with different tastes. In Mexico, where "Frijoles" form a part of almost every meal, they are usually prepared by first boiling until tender and then frying in lard, usually until reduced either wholly or in large part to a paste, which is commonly of a chocolate color, sometimes shaded with violet, owing to the color of the seeds thus employed.

Beans are quite extensively cultivated in all parts of the world where there are at least three or four months of the year free from frost. Santa Barbara and Ventura counties in California produce by far the largest quantity of Lima beans of any similar area in the world, upwards of 2,000

carloads having been grown there in a single season. The soy bean is much grown for food in Japan and the broad bean in Eastern Europe. Otherwise the producing area is very general, not being confined to any particular region.

In methods of culture, beans are most conveniently classed as climbers and dwarfs. The former, of whatever species, require certain treatment while the latter are quite differently grown, and require a shorter season to mature. With the exception of *Vicia Faba*, all are quite tender and succeed best in a rich, light, well drained and somewhat sandy soil, with warm exposure.

The seed is planted as soon in spring as the ground is warm and all danger of frost is past, one or two inches deep. Thorough cultivation is given through the season, and if rainfall is below normal the yield may be greatly increased by irrigation. The Limas are even more tender than the others, and it is especially important that the ground be warm before they are planted, otherwise they will rot. The climbers are planted in hills of four to five seeds each, three to four feet apart each way, with stakes five to eight feet long driven into the ground at each hill, around which the plants will readily twine. In two to three months from planting, the edible podded sorts will be ready for use, and if gathered as they mature the plants will continue to bear until frost, unless severe drought shortens their season of productiveness. The dwarfs are ordinarily planted in drills four to eight inches apart in rows two to two and a half feet apart, the exact distance depending on the variety. The earlier sorts will produce edible pods in six to eight weeks and from two to four pickings may be made in as many weeks after the first gathering.

A collection of early, medium and late varieties, as Wardwell, Black Wax and Refugee, together with a few climbing sorts, will produce a continuous supply from early summer until frost kills the vines. Successional plantings

of early dwarf kinds every two or three weeks will give the same results, and two or three crops may be taken from the same ground in a season. The pods are gathered in the ordinary vegetable crate, placed upon the market and sold in bulk by pint, quart, peck or bushel as the case may be.

The dwarf sorts are often forced for their green pods and are quite profitable where there is considerable demand. They require a temperature of from 60–70 degrees and when they bloom the atmosphere should be quite dry. The plants may be grown in pots or boxes and set in the most convenient places or planted in benches; in any event it is important that an abundance of bottom heat be supplied. The pods are usually tied in bunches of fifty and sell for from twenty to fifty cents per bunch. Davis, Triumph, Flageolet Wax, Sion House and Canadian Wonder are among the best for forcing.

Vicia Faba, the English broad bean, requires entirely different treatment. It is much more hardy than other beans and requires a moderately rich, cool, stiff, heavy loam and a cool exposure. Our summers are too hot for its best development and therefore it is little grown in this country. The seed, which requires from five to eight days to germinate, is planted in the same manner as dwarf beans as early as the ground will permit, usually the last of February or early March in the latitude of St. Louis. The plants may also be started under glass in January or February and afterward transplanted to the open ground, thus making more certain the chances of escaping the hot weather. In southern Europe the seed is often sown in October or November and the young plants are protected during winter by covering with frames. In cultivating it is best to draw the earth well up toward the plants to keep them more erect. After the first blossoms appear the tips are pinched, which tends to make the plant more branchy and lessens the damage by Aphides which otherwise appear in dense masses around the bloom. Seed for immediate

use should not be allowed to fully ripen but is better if gathered when the hilum first turns black. For ripe seed the crop may remain longer in the field.

The most destructive insect enemy is the bean-weevil (*Bruchus obsoletus* Say), a brownish-black beetle about one-tenth inch long. The eggs are laid on the young pods at the time when the seed is beginning to form, the larvae hatching eight or ten days later and immediately working their way into the seed, feeding on the latter most of the summer. Many larvae usually burrow into the same seed, which destroys its germinating power and renders it worthless for food. As a rule the larvae pupate in early autumn and some transform to beetles in a few weeks while others remain in the pupa stage until spring. The partially grown larvae may be killed by subjecting the fresh ripe seed to a temperature of 145° Fahrenheit. The larvae or beetles may be destroyed by fumes of bisulphid of carbon, benzine or gasoline, by placing the seed in a tight vessel and adding a little of either substance. Care should be taken that no fire comes in contact with the gases.

In the forcing house, beans are subject to attack from red spider and green fly. The former may be kept in check by frequent syringing and the latter by fumigating with tobacco.

Numerous fungous diseases are known to occur on this group of plants, but only a few cause serious injury. They may be held in check by spraying with a weak solution of Bordeaux mixture, or ammoniacal copper carbonate. The bean anthracnose (*Colletotrichum lagenarium* Pass.) is probably the most destructive. It develops most freely during rainy weather, producing ulcers on the young pods and leaves and frequently extending to the stem and branches. When occurring on the pods it is known as pod spot. The beginning of the disease is but a minute speck which soon enlarges and in extreme cases covers the entire pod or leaf.

The bean rust (*Uromyces Phaseoli* Wint.) occurs in scattered brown spots on both sides of the leaves, at first very small but gradually enlarging, and as the spores mature the diseased area presents a blackish appearance.

The Lima bean mildew (*Phytophthora Phaseoli* Thaxter) is of somewhat more rare occurrence but occasionally appears in widely separated localities. This disease attacks all parts of the plant in the form of a whitish covering, but most seriously and frequently affects the pods.

KEY TO THE SPECIES OF PHASEOLUS.

Seed less than ¾ in. long, or if longer much flattened and usually subreniform.

Seed with conspicuous rays from the hilum to the dorsal suture, lunate or subreniform, much flattened except in one variety. Flowers small, greenish white. *P. lunatus.*

Seed with inconspicuous or no rays, rarely lunate. Flowers of medium size, white or purplish violet. *P. vulgaris.*

Seed more than ¾ in. long, more or less tumid, less than twice as long as broad, not usually reniform. *P. multiflorus.*

P. LUNATUS L.

Phaseolus lunatus Linn. Sp. Pl. 724. (1753). — **3**: 1031. [ed. Willd.]. (1800). — Miller, Gard. Dict. (1807). — DC. Prodr. **2**: 393. (1825). — Maycock, Fl. Barb. 293. (1830). — Benth. Fl. Bras. **15**[1]: 181. (1859). — Bailey, Cyclop. Am. Hort. **3**: 1295. (1901).

Phaseolus foecundus, P. saccharatus, Macfadyen, Fl. Barb. 281, 282. (1837).

Phaseoli magni latè albi. Lobel. Ic. Stirp. **2**: 60. [*t. 70.*] In part. (1591).

Phaseoli Brasiliani VII, VIII, IX, X. Gerarde, Hist. Pl. 1041. (1597).

Phaseolus peregrinus VII, VIII, IX, X, XI. Clus. Pl. Hist. **2**: 225. (1601).

Phaseolus peregrinus angustifolius: an idem cum Smilace hortensi minore. Bauhin. Pinax 340. (1623). — Tournef. Inst. 413. (1719).

Phaseolus peregrinus primo similis, fructu lato, albo, striato. Bauhin. Pinax 340. (1623). — Tournef. Inst. 413. (1719).

Phaseolus peregrinus angustifolius alter, fructu ex albo & nigro vario. Bauhin. Pinax 340. (1623). — Tournef. Inst. 413. (1719).

Phaseolus peregrinus foliis minoribus, fructu exalbido, nonnunquam variegato. Bauhin. Pinax 340. (1623). — Tournef. Inst. 413. (1719).

Phasiolus latus albo ex nigro varius, angustifolius. Bauhin. Hist. Pl. **2**: 268. (1651).

Phasioli lati, candicantes virgulis nigricantibus notati secundum longitudinem, vel nigricantes: flore albo. Bauhin. Hist. Pl. **2**: 268. (1651).

Phasioli lati, prorsus nigri. Bauhin. Hist. Pl. **2**: 269. (1651).

Phaseolus peregrinus, fructu lato, compresso, albo. Tournef. Inst. 413. (1719).

Field Columbian Museum, seeds, No. 11389: Philadelphia Commercial Museum, seeds, No. 5077, "Cubaces amarillos;" Aserri, Costa Rica; 5088, "Cubaces," Aserri, Costa Rica; 5528, "Cubaces blancos y morados," La Laguna, Puriscal, Costa Rica; 5534, "Cubaces higuerillos," La Laguna, Puriscal, Costa Rica; 5549, "Cubaces," Puriscal, Costa Rica; 10599, "Buba," Portuguese West Africa; 10640, "Guaracaros pintados;" 10968, Red flat "Ixtapacal," Guatemala.

Plants climbing 5–8 ft. or dwarf (1–2 ft.) in some garden varieties. Leaflets ovate, acuminate, rather thin. Blossoms white or greenish white, in racemes equal to or shorter than leaves. Pods 1½–4 in. long, ½–¾ in. broad, flat, lunate, usually tipped with a short stout spur, containing 2–4 beans. Seed ½–⅝ in. long, about as broad, much flattened, lunate, subreniform or often angled, variously colored.

VARIETIES OF P. LUNATUS.

Seed small and flat, usually less than ½ in. long.
White.
Leaves broadly ovate.
Plant a climber. — CAROLINA.
Plant dwarf. — HENDERSON.
Leaves usually linear-lanceolate. — WILLOW LEAF.
Black, brown or speckled.
Black or speckled with black. — BLACK LIMA.
Brown, speckled with a darker shade. — JACKSON.
Seed larger than last, except Kumerle which is tumid, other varieties flat or tumid. — *P. lunatus macrocarpus.*
Seed flat.
White.
Plant a climber.
Pods 3–4 in. long.
Late. — LARGE WHITE.
Early. — JERSEY.
Pods 5–7 in. long. — FORD.
Plant dwarf. — BURPEE.
Speckled. — SPECKLED.
Seed tumid, white.
Large, usually ¾–1 in. long, plant a climber.
Pods 3–4 in. long. — DREER.
Pods 2–3 in. long. — CHALLENGER.
Seed smaller than last, plant dwarf. — KUMERLE.

a. Seed white.

CAROLINA.* Plant rather vigorous, with many runners. Leaflets 2½–3 in. long, 2–2½ in. broad. Pods 3–4 in. long, a little curved, usually containing 3–4 beans. Seed white, quite uniform in size and shape. An early variety and one of the oldest in cultivation. — Plate 38, f. 1.

HENDERSON.† Plant 12–15 in. high, compact, bushy, bearing freely. Otherwise identical with the preceding. First found growing along a roadside in Virginia about 1875 and introduced in 1889.

WILLOW LEAF.‡ Plant climbing 5–6 ft., with few branches, moderately vigorous. Leaves usually linear-lanceolate, 6–7 in. long, ¾–1 in. broad. Very late. Otherwise identical with Carolina. This variety is evidently not well fixed, as broadly ovate leaves occasionally appear. It is frequently planted for ornamental purposes and by many considered more valuable as such than as a garden esculent, the quality not being the best. Introduced 1891. — Plate 38, f. 2.

aa. Seed black, brown or variegated.

BLACK LIMA.§ Identical with Carolina except in color

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* *Carolina, Sieva, Saba* or *Small Lima.* Browne, Rept. U. S. Pat. Off. 338. (1854). — *Carolina* or *Sieva Lima.* Bailey, Bull. Cornell Exp. Sta. 115: 295. (1896). — *Sieva.* Burr, Field & Gard. Veg. 499. (1863). — *Haricot de Sieva.* Vilmorin-And. Pl. Pot. 279. (1883). — *Dreer's gelblich-weisse von Sieva.* Haage & Sch. Haupt-Verz. (1878).

Field Columbian Museum, seeds belonging to this or the two following varieties, No. 13228, 26662: Philadelphia Commercial Museum, seeds, No. 10554, "Guaracaros blancos," Venezuela; 10555, Corrientes, Argentina; 10643, "Caraotas blancas," State of Carabobo, Venezuela; 10840, Uruguay Rural Assoc., Montevideo, Uruguay; 10866, Chivilcoy, State of Buenos Ayres, Argentina.

† *Henderson Bush Lima.* Bailey, Bull. Cornell Exp. Sta. 87: 95. (1895).

‡ Bailey, Bull. Cornell Exp. Sta. 115: 295. (1896).

§ Bailey, Bull. Cornell Exp. Sta. 115: 295. (1896). — *Early Black.* Beach, Bull. N. Y. Exp. Sta. 69: 258. (1894).

Phaseolus peregrinus lobo & fructu nigro. Bauhin. Pinax 340. (1623). — Tournef. Inst. 413. (1719).

Philadelphia Commercial Museum, seeds, No. 10812, Brazil.

of seeds, which are black or spotted and blotched with black. Introduced 1892. — Plate 38, f. 3.

JACKSON.* Plant dwarf, 18–20 in. high, quite loosely spreading, usually with few runners 1–2 ft. long. Seed brown, speckled and splashed with a darker shade. Very productive, but the color of the seeds of both this and the preceding variety is objectionable for table purposes. Introduced 1891. — Plate 38, f. 4.

P. lunatus macrocarpus Benth.

Phaseolus inamoenus Linn. Sp. Pl. 724. (1753). — DC. Prodr. **2**: 393. (1825). — Miller, Gard. Dict. (1807).
Phaseolus Xuaresii Zucc. DC. Prodr. **2**: 393. (1825).
Phasoelus Limensis, P. latisiliquus Macfadyen, Fl. Jam. 279, 282. (1837).
Phaseolus lunatus macrocarpus Benth. Fl. Bras. **15**[1]: 181. (1859). — Bailey, Cyclop. Am. Hort. **3**: 1295. (1901).
Phaseolus I. sive Purkircherianus. Clus. Hist. Stirp. 722. (1583).
Phaseoli magni latè albi. Lobel. Ic. Stirp. **2**: 60. (1591). In part.
Phaseoli Brasiliani ad vium. Gerarde, Hist. Pl. 1040. (1597).
Phaseolus peregrinus I. Clus. Hist. Pl. **2**: 222. (1601).
Phaseolus peregrinus hortensi affinis, semine lato albo, multis nigris venis striato. Bauhin. Pinax 340. (1623). — Tournef. Inst. 413. (1719).
Phaseolus novi orbis latus, totus candidus Smilaci hortensi affinis. Bauhin. Hist. Pl. **2**: 268. (1651).
Phaseolus peregrinus, fructu lato, compresso, albo. Tournef. Inst. 413. (1719). In part.
Field Columbian Museum, seeds, No. 12016, 12020: Philadelphia Commercial Museum, seeds, No. 10793, Cape Verde, Africa.

Plant a vigorous climber 10–12 ft. high, with dwarf garden varieties 15–20 in. high. Leaflets rather large, 3–4 in. long, broadly ovate, often diamond shaped, glabrous or slightly pubescent, thick, quite smooth. Pods 3–5 in. long, 1–1¼ in. broad, flat, usually distinctly curved, tipped with a short stout spur, containing 3–4 beans. Seed ⅝–1 in. long, ½–⅝ in. broad, flat, decidedly kidney shaped, variously colored.

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* Bailey, Bull. Cornell Exp. Sta. 87: 95. (1895). — *Jackson Wonder Dwarf Sieva.* Thorburn, Cat. (1897).
Field Columbian Museum, seeds, No. 13230: Philadelphia Commercial Museum, seeds, No. 10559, Clark Co., Ga.; 10627, "Guaracaros pintados," Venezuela.

LARGE WHITE.* This variety is typical of the species except that it lacks in vigor, the plants rarely more than 8 or 10 ft., moderately productive, very late.—Plate 38, f. 5.

JERSEY.† Identical with the preceding except in maturing its seed at least two weeks earlier.

FORD.‡ A strain with pods 5–7 in. long. Notwithstanding the large size of the pods it is not more productive than the preceding.—Plate 38, f. 6.

BURPEE.§ Plants dwarf, 15–18 in. high, much branched, inclined to produce a few runners, very productive and early. One of the best dwarf Limas.—Plate 38, f. 7.

SPECKLED.‖ Plant a vigorous grower, usually running 10–12 ft. Leaflets rather large for the type. Pods 3–4 in. long. Seed $\frac{5}{8}$–$\frac{7}{8}$ in. long, white, speckled and blotched with dark reddish-brown. An early and moderately productive variety. Introduced about 1867.—Plate 38, f. 8.

DREER.¶ Plant 6–8 ft. high, vigorous. Leaflets quite large and thick. Pods straight or nearly so, 2–4 in. long, 1–1$\frac{1}{4}$ in. broad, $\frac{3}{8}$–$\frac{1}{2}$ in. thick, without spur, containing 3–4 beans. Seed dull or greenish-white, about as long as broad, with rounded sutures, tumid, $\frac{1}{2}$–$\frac{5}{8}$ in. long, $\frac{5}{16}$–$\frac{3}{8}$ in.

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* Bailey, Bull. Cornell Exp. Sta. 115: 296. (1896).—*Lima*. Burr, Field & Gard. Veg. 495. (1863).—*Common Lima*. Vilmorin-And. Veg. Gard. 73. (1885).—*Haricot de Lima*. Vilmorin-And. Pl. Pot. 278. (1883).

† Bailey, Bull. Cornell Exp. Sta. 115: 297. (1896).—*Early Jersey Lima*. Thorburn, Cat. (1892).—*Bliss*. Bailey, l. c.

‡ *Ford's Mammoth*. Thorburn, Cat. (1897).

§ *Dwarf Large Lima*. Long, Am. Gard. **11**: 397. (1889).—*Burpee's Bush Lima*. Bailey, Bull. Cornell Exp. Sta. 87: 96. (1895).

‖ Bailey, Bull. Cornell Exp. Sta. 115: 299. (1896).—*Red Lima*. Fide Bailey, l. c.—*Mottled Lima*. Burr, Field & Garden Veg. 497. (1863).—*Mottled Lima* or *Marbled Cape*. Vilmorin-And. Veg. Garden 73. (1885).—*Haricot du Cap marbré*. Vilmorin-And. Pl. Pot. 279. (1883).—*Dreer's marbrirte*. Haage & Sch. Haupt-Verz. (1876).

Field Columbian Museum, seeds, No. 12022: Philadelphia Commercial Museum, seeds, No. 454. St. Nickolan, Cape Verde, W. Africa.

¶ *Dreer's verbesserte*. Haage & Sch. Haupt-Verz. (1891).

thick. Very productive, medium early and of excellent quality.— Plate 38, f. 9.

KUMERLE.* Plant 10–15 in. high, strictly dwarf, very bushy. Leaflets small, 2½–3 in. long, 2–2½ in. broad, often long ovate, more or less truncate at base. Pods about 3 in. long by ⅝ in. broad and ⅜ in. thick, usually curved a little, borne near the ground, hence apt to rot during damp weather.— Plate 38, f. 10.

CHALLENGER.† Identical with the preceding except that the pods are 2–3 in. long.

P. VULGARIS L.

Phaseolus vulgaris Lobel. Ic. Stirp. **2**: 59. (1591). — Tournef. Inst. 412. (1719). — Linn. Sp. Pl. 723. (1753). — [ed. Willd.] **3**: 1030. (1800). — Miller, Gard. Dict. (1800). — DC. Prodr. **2**: 392. (1825). — Benth. Fl. Bras. **15**[1]: 182. (1859). — Martens, Gartenbohnen 25. (1860). — Bailey Cyclop. Am. Hort. **3**: 1296. (1901).

Phaseolus nanus Linn. Sp. Pl. 1017. (1763). — [ed. Willd.] **3**: 1036. (1800).

Phaseolus compressus DC. Prodr. **2**: 393. (1825).— Martens, Gartenbohnen 39. (1860).

Phaseolus oblongus Savi, DC. Prodr. **2**: 393. (1825). — Martens, Gartenbohnen 50. (1860).

Phaseolus saponaceus Savi, DC. Prodr. **2**: 393. (1825).

Phaseolus gonospermus Savi, Martens, l. c. 45.

Phaseolus carinatus Martens, l. c. 49.

Phaseolus ellipticus Martens, l. c. 60.

Phaseolus sphaericus Martens, l. c. 69.

Phaseolus albus. Gerarde, Hist. Pl. 1038. (1597).

Phaseolus niger. Gerarde, l. c. — Raius, Hist. Pl. **1**: 884. (1686).

Smilax hortensis sive Phaseolus major. Bauhin. Pinax 339. (1623).

Smilax hortensis minor. Bauhin. l. c.

Smilax siliqua sursum rigente: vel Phaseolus parvus Italicus. Bauhin. l. c.

Phaseolus fructu diverso vel parvo & nigro albis venis. Parkinson, Theat. 1056. (1640).

Smilax hortensis. Bauhin. Hist. Pl. **2**: 255. (1651). — Raius, Hist. Pl. **1**: 884. (1686).

Phaseolus vulgaris Italicus humilis, seu minor albus cum orbita nigricante. Raius, Hist. Pl. **1**: 885. (1686).

Phaseoli tumidi minores nivei. Raius, l. c.

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* *Thorburn* or *Kumerle Dwarf Lima*. Bailey, Bull. Cornell Exp. Sta. 87: 96. (1895).

† Thorburn, Cat. (1885).

Phaseolus tumidus minimus niveus siliqua brevi, Virginianus. Bauhin. l. c.
Phaseolus vulgaris, fructu nigro. Tournef. Inst. 412. (1719).
Phaseolus vulgaris, fructu flavo. Tournef. l. c.
Phaseolus vulgaris, fructu rubro. Tournef. l. c.
Phaseolus vulgaris, fructu livido. Tournef. l. c.
Phaseolus vulgaris, fructu pallido. Tournef. l. c.
Phaseolus vulgaris, fructu violaceo. Tournef. l. c.
Phaseolus vulgaris, fructu ex rubro & nigro variegato. Tournef. l. c.
Phaseolus vulgaris, fructu albo, nigris venis & lituris distincto. Tournef. l. c.
Phaseolus vulgaris, fructu purpurascente, orbibus albis variegato. Tournef. l. c. 413.
Phaseolus hortensis, minor. Tournef. l. c.

Plant subglabrous, dwarf or climbing 6 feet or more. Leaflets ovate-acuminate, often oblique. Flowers in racemes shorter than the leaves, white or purplish violet, medium size. Pods flattened to subcylindrical, straight or curved, more or less turgid. Seed variable in size, shape and color. — Plate 45, f. 1.

VARIETIES OF P. VULGARIS.

* Seed subglobose or very slightly flattened or elongated, smooth; pods subterete.

† Seed white.

Usually less than $\frac{5}{16}$ in. largest diameter.
Plant a climber. — RICE.
Plant dwarf or bushy with few runners. — DWARF RICE.
Slightly elongated, ovate, usually $\frac{5}{16}$–$\frac{3}{8}$ in. long.
Pods less than 4 in. long.
Plant a climber. — PRÉDOME.
Plant dwarf. — DWARF PRÉDOME.
Pods more than 4 in. long.
Plant a climber. — PRINCESS.
Plant dwarf. — DWARF PRINCESS.
Decidedly globose, usually more than $\frac{3}{8}$ in. largest diameter.
Plant a climber. — SUGAR.
Plant dwarf. — DWARF SUGAR.

†† Seed black.

Plant a climber. — QUEEN.

** Seed distinctly elongated ovate, breadth usually $\frac{1}{2}$ the length or more, not usually reniform, rounded or tapering or sometimes truncated. Pods subterete, rarely flattened.

† Seed one color.

Small, ¾ in. long or less, white, smooth. NAVY.
Larger than the preceding, some varieties more or less wrinkled or dented.
Seed black, pods yellow.
Plant a climber. INDIAN CHIEF.
Plant dwarf. BLACK WAX.
Seed white.
Pods yellow.
Plant a climber. WHITE ALGERIAN.
Plant dwarf. WHITE WAX.
Pods green.
Seed uniformly oblong; plant dwarf. MARROW.
Seed tumid, often wrinkled; plant climbing. SOPHIE.
Seed neither black nor white.
Dark reddish brown.
Pods yellow.
Plant a climber. MONT D'OR.
Plant dwarf. DWARF MONT D'OR.
Pods green.
Plant a climber. CHERRY.
Plant dwarf. DWARF CHERRY.
Yellowish brown, light brown, or flesh color.
Pods yellow.
Seed yellowish. YELLOW CANADA.
Seed darker than the last. YELLOW PRINCESS.
Pods green. SIX WEEKS.
Light sulphurous yellow. GOLDEN CRANBERRY.

†† Seed variegated, spotted, splashed or striped.

Seed with solid black stripes extending nearly or quite the entire length. ZEBRA.
Seed spotted or splashed or with few short stripes.
With no white markings.
Plant a climber.
Pods green. HORTICULTURAL.
Pods yellow. SPOTTED WAX.
Plant dwarf.
Pods green. DWARF HORTICULTURAL.
Pods yellow. HORTICULTURAL WAX.
More or less marked with white.
Finely splashed with white. CORN BEAN.
Solid white over a portion of surface. GOLDEN WAX.

*** Seed proportionally longer than the preceding.

† Ovate-oblong, often a little flattened.

‡ Usually less than twice as long as broad.

← One color.

Seed white.

Warped or dented, with hilum a little to one side.

Skin not folded; plant a runner. INTESTIN.

Outer skin considerably folded; plant dwarf. WHITE VALENTINE.

Not warped as in the preceding.

Plant a climber. WHITE ASPARAGUS.

Plant dwarf.

Seed snow white, yellowish line around the hilum. EDIBLE POD.

Seed dingy white, no yellow line. LONG PRINCESS.

Seed black.

Pods green. EARLY NEGRO.

Pods yellow.

Flattened. CURRIE.

Terete.

3–4 in. long. CYLINDER.

4–6 in. long. YOSEMITE.

Seed neither black nor white.

Small, usually less than ½ in. long.

Reddish brown. ORLEANS.

Dark yellowish brown; plant a climber. SOUTHERN PROLIFIC.

Light yellow; plant dwarf.

Pods green. HUNDREDFOLD.

Pods yellow. DIGOIN.

Pods white. WHITE POD.

Larger than the preceding, usually more than ½ in. long and proportionally larger in diameter.

Bright sulphurous yellow. ROB ROY.

Light dun but not glistening. RUSSIAN.

Glistening dark dun or reddish; plant dwarf. SIR JOSEPH PAXTON.

Dark brown.

Pods broader than thick. BROWN HOLLAND.

Pods usually thicker than broad. STRINGLESS.

Seed variegated.

With no white markings.

Marked more or less with black.

Pods green. REFUGEE.

Pods yellow. REFUGEE WAX.

With no black marks.
Dark reddish brown predominating.
Brown. OSBORN.
Red. WARWICK.
Light reddish or yellowish with darker splashings.
Blotches distinct. SION HOUSE.
Blotches obscure. HINRICH.
More or less marked with white.
White area covering nearly half or more than half the surface.
Obscurely splashed with yellow. IMPROVED HINRICH.
Not as last.
White separated from the other colors by a continuous or nearly continuous line. BICOLOR.
White more than half and separated from the other colors by a broken line or with many outstanding spots. Pods yellow. DETROIT.
White covering about half the surface and separated from the other color by a very irregular line. EARLY CHINA.
White area less than in the preceding.
Other color chocolate brown splashed with red and a few spots on the white. KEENEY.
Chocolate brown, a few spots on the white. RACHEL.

‡‡ Seed usually twice as long as broad.

+ One color.

White.
Not usually kidney shaped. WHITE SWISS.
More or less kidney shaped.
Pods straight or nearly so.
Plant 12–15 in. high. WHITE KIDNEY.
Plant 8–10 in. high. MAINE.
Pods curved but not bent nor wrinkled.
Plant dwarf but inclined to produce runners. DAVIS.
No indication of runners.
Seed with no green. WHITE FLAGEOLET.
Seed tinged with green.
Pods green. LONG FLAGEOLET.
Pods yellow. ÉTAMPES.
Pods bent and warty. KRUMSCHNABEL.
Black.
Pods green. LONG NEGRO.
Pods yellow. LONG ALGERIAN.
Brown or brownish yellow.
Plant a climber. KENTUCKY WONDER.

Plant dwarf.
Seed dented and warped. CREAM.
Seed smooth.
Plant 1 ft. high. NE PLUS ULTRA.
Plant 15–18 in. high.
Pods green.
Seed dark dun. DUN.
Seed yellow. LONG YELLOW.
Pods yellow. DATE.

++ Seed variegated.

Seed mostly white with dark markings on ventral side, usually extending to or around the ends. WARDWELL.
Seed mostly white, usually with two black dots at each end of the hilum. MATCHLESS.
Seed splashed with more or less black except in Ilsenburger which is drab.
Plant a climber. BULGARIAN.
Plant dwarf.
Seed less than ½ in. long. MARVEL.
Seed larger than the last.
Leaves deeply and uniformly curled. NETTLE LEAVED BAGNOLET.
Leaves slightly or not at all wrinkled.
Seed mostly black.
Plant less than 1 ft. high. PRIDE OF LYON.
Plant taller than the last. BLACK SPECKLED.
Seed mostly red or brown with only a slight trace of black. MOHAWK.
Drab predominating. ILSENBURGER.
Seed not speckled with black.
Pods green.
Plant 10–12 in. high.
Seed cylindrical.
Bright red and yellow. VALENTINE.
Yellow and drab. LONGFELLOW.
Seed slightly but distinctly broader than thick. WILLIAMS.
Plant 15–18 in. high.
Seed light red with few faintly darker splashings. RED SPECKLED.
Seed blood red with few lighter splashings. BLOOD SPECKLED.
Pods yellow. WAX VALENTINE.

†† Seed elongated, flattish, usually quite broad.

‡ Less than twice as long as broad, in the larger sorts width often half the length or a little more.

Seed one color.

White.

Less than ½ in. long. JULY.

Half to five-eighths in. long, dingy white.

Ovate, surface often finely wrinkled.

Plant dwarf. AUGUSTA.

Plant a climber. PRINCESS BISMARCK.

Surface generally smooth.

Plant a climber.

Pods 2–4 in. long. GOLDEN CLUSTER.

Pods 4–6 in. long.

Green. CASE KNIFE.

Yellow. WAX CASE KNIFE.

Plant dwarf.

Pods 3–4 in. long. INEXHAUSTIBLE.

Pods 4–6 in. long.

Green. DWARF CASE KNIFE.

Larger than the preceding, snow or milk white.

With no greenish tinge.

Plant a climber. SOISSONS.

Plant dwarf. DWARF SOISSONS.

With distinct tinge of green. GREEN SOISSONS.

Seed black.

Usually less than ⅜ in. long.

Plant very dwarf, usually less than 10 in. high. SMYTH'S HYBRID.

Plant larger than the preceding; seed smaller. TURTLE SOUP.

Larger than the preceding.

Pods green. BLACK SIMITAR.

Pods white. WHITE ZULU.

Seed neither black nor white.

Small, usually less than ½ in. long.

Red or reddish brown. CHARTRES.

Not as the last.

Plant a climber. EMPEROR.

Plant dwarf; pods green. WILLMOT.

Seed usually more than ½ in. long.

Bulged, blackish brown. JAPAN.

Reddish brown. RED SOISSONS.

Yellowish brown.
Pods purple.
Plant a climber. PURPLE POD.
Plant dwarf. DWARF PURPLE POD.
Pods green.
Plant dwarf. SUPERB.
Plant a climber. THÜRINGEN.
Seed variegated.
Small, usually less than ½ in. long, red and black. FORTY DAYS.
Larger than the last.
With prominent white or gray markings. FEJEE.
Little or no white, reddish with black stripes.
Pods 5–7 in. long. REINE.
Pods 3–4 in. long. MARBLED SWORD.

‡‡ Seed more than twice as long as broad.

One color.
White, with or without trace of green or yellow.
Leaves deeply and uniformly wrinkled throughout.
NETTLE LEAVED CANTERBURY.
Leaves slightly or not at all wrinkled.
Seed usually tinged with green.
Pods 5–6 in. long. WONDER.
Pods shorter. BAGNOLET VERT.
Seed tinged with yellow. WHITE LYONNAISE.
Seed with no green or yellow. TRIUMPH.
Black.
Usually more than § in. long. AMERICAN WAX.
Smaller than last. GOLDEN CHAMPION.
Neither black nor white.
Yellowish brown.
Plant dwarf. LYONNAISE.
Plant a climber. JAVA.
Chocolate brown. CHOCOLATE.
Reddish brown or crimson.
Very large, ¾ in. long. CRIMSON FLAGEOLET.
Smaller than last.
Pods green.
Plant dwarf. CANADIAN WONDER.
Plant a climber. VEITCH'S CLIMBING.
Pods yellow. RED FLAGEOLET.
Seed variegated. IMPROVED FLAGEOLET.

a. **Seed subglobose or slightly elongated or flattened; pods subterete.**

*** Seed small, white, usually less than ⅜ in. long.**

Rice.* Plant climbing 4–6 ft., rather weak growing. Leaflets large, 2–2¼ in. long, 1¾–2 in. broad, thin, smooth. Blossoms white. Pods light green, subterete, 2–3 in. long, ¼ in. thick, often slightly curved; spur short, curved. Seed dingy white with yellowish tinge, quite variable in size and shape, ¼–5/16 in. long, nearly as broad, slightly flattened, rounded or a little truncate at the ends. Late and moderately productive, with tender pods. — Plate 38, f. 11.

Dwarf Rice.† Plant bushy, 10–12 in. high, producing few runners a foot long. Seed slightly larger than the preceding, otherwise identical. — Plate 38, f. 12.

Prédome.‡ Plant climbing 3–4 ft., moderately vigorous. Stem slender, much branched. Leaflets small, 2–2½ in. long, 1½–1¾ in. broad, thin, considerably wrinkled. Blossoms white. Pods green, slightly flattened, 2½–3½ in. long, ¼ in. broad, nearly straight, spur short, nearly straight. Seed white, 5/16–⅜ in. long, ¼–5/16 in. wide, slightly flattened, subtruncate. Early, productive and tender. — Plate 38, f. 13.

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* *Round White Rice.* Vilmorin-And. Veg. Gard. 40. (1885). — *Haricot riz à rames.* Vilmorin-And. Pl. Pot. 247. (1883). — *Stangenbohne, Reis Perl.* Haage & Sch. Haupt-Verz. (1876).

Phaseolus gonospermus oryzoides Martens, Gartenbohnen 48. [*t. 5. f. 7*]. (1860).

† *Dwarf White Rice.* Vilmorin-And. Veg. Gard. 51. (1885). — *Haricot Comtesse de Chambord.* Vilmorin-And. Pl. Pot. 259. (1883). — *Buschbohne, Reis Perl.* Haage & Sch. Haupt-Verz. (1880).

Philadelphia Commercial Museum, seeds belonging to this or the preceding variety, No. 5057, "Frijoles blancos," Zacatecoleuca, Salvador; 10452, Tenancingo, State of Mexico, Mexico.

‡ Gard. Chron. **2**:236. (1842). — *Predhomme.* Burr, Field & Gard. Veg. 486. (1863). — *White Prédome.* Vilmorin-And. Veg. Gard. 54. (1885). — *Haricot Prédome.* Vilmorin-And. Pl. Pot. 262. (1883).

DWARF PRÉDOME.* Plant strictly dwarf, 9–12 in. high, branchy. Leaflets $2\frac{1}{2}$–3 in. long, $1\frac{3}{4}$–2 in. broad, wrinkled. Blossoms white. Pods green, 3–$3\frac{1}{2}$ in. long, $\frac{3}{8}$ in. broad, subterete, slightly curved; spur short, nearly straight. Seed an ivory white, quite uniform in size, $\frac{1}{4}$–$\frac{3}{8}$ in. long, $\frac{3}{16}$–$\frac{1}{4}$ in. broad, nearly as thick, often with truncated ends. — Plate 38, f. 14.

PRINCESS.† Plant climbing 5–6 ft., moderately vigorous. Leaflets yellowish green, 2–$2\frac{1}{2}$ in. long, $1\frac{1}{2}$–$1\frac{3}{4}$ in. broad, wrinkled, thin. Blossoms white. Pods green, 4–$4\frac{1}{2}$ in. long, $\frac{3}{8}$–$\frac{1}{2}$ in. broad, subterete, nearly straight. Seed $\frac{5}{16}$–$\frac{3}{8}$ in. long, $\frac{1}{4}$–$\frac{5}{16}$ in. broad, subovate to oblong, with rounded ends, separated some distance in the pods. — Plate 38, f. 15.

DWARF PRINCESS.‡ Identical with the preceding except that the plants are strictly dwarf, 9–12 in. high, and a little earlier.

** Seed white, usually more than $\frac{3}{8}$ in. long.

SUGAR.§ Plant climbing 4–6 ft., moderately vigorous, with few runners. Leaflets 3–4 in. long, $1\frac{1}{2}$–$2\frac{1}{2}$ in. broad, light green, a little rough but not wrinkled, thin. Blossoms white. Pods green, 3–4 in. long, $\frac{3}{8}$–$\frac{5}{8}$ in. broad, $\frac{1}{4}$ in. thick, subterete, slightly curved, a little swollen by the beans; spur curved, stout, $\frac{1}{2}$ in. long. Seed dingy white, $\frac{7}{16}$–$\frac{1}{2}$ in. long, nearly as broad and thick, irregularly ovate

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* Vilmorin-And. Veg. Gard. 62. (1885). — *Haricot Prédome nain.* Vilmorin-And. Pl. Pot. 270. (1883).

Philadelphia Commercial Museum, seeds belonging to this or the preceding variety, No. 10448, State of Tucuman, Argentina; 10880, State of Buenos Ayres, Argentina.

† Burr, Field & Gard. Veg. 487. (1863). — *Haricot Princesse à rames.* Vilmorin-And. Pl. Pot. 263. (1883).

Phaseolus ellipticus albus Martens, Gartenbohnen 65. (1860.)

‡ Vilmorin-And. Veg. Gard. 63. (1885). — *Haricot Princesse nain.* Vilmorin-And. Pl. Pot. 270. (1885).

§ *Stangenbohne, Zucker* oder *Butter*. Haage & Sch. Haupt-Verz. (1876).

to nearly spherical. Poor bearer and medium early. — Plate 38, f. 16.

DWARF SUGAR.* Plant strictly dwarf, 12–15 in. high, much branched, compact, of vigorous growth, bearing many pods. Otherwise identical with the preceding.

aa. Seed ovate, breadth equal to ⅔ the length or more.

NAVY.† Plant 1–1½ ft. high, producing numerous runners about a foot long, often spreading or trailing. When grown on poles attains a height of 2–2½ ft. Stem rather slender. Leaflets deep green, 2–2½ in. long, roundish ovate, slightly wrinkled, somewhat coriaceous. Blossoms white. Pods yellowish green, 3–4 in. long, ⅜ in. broad, subterete, slightly curved, borne in clusters of three or four; spur ½ in. long. Seed white with veiny markings, ¼–⅜ in. long, $\frac{3}{16}$–¼ in. wide.

The pods are very inferior for cooking purposes but the seed is much used in baking and for stock food, hence grown largely as a field crop. The famous "Boston baked beans" are prepared from this variety. — Plate 38, f. 17.

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* *Buschbohne, Speck weisse* etc. Haage & Sch. l. c.

Philadelphia Commercial Museum, seeds belonging to this or the preceding variety, No. 10885, Buenos Ayres, Argentina: Field Columbian Museum, No. 12017.

† *Pea-Bean.* Burr, Field & Gard. Veg. 467. (1863). — *True White Pea.* [Wing], Rept. N. Y. Exp. Sta. **1**: 104. (1882). — *White Navy* or *Pea Bean.* Sibley, Cat. (1883). — *California Branch.* Tillinghast, Cat. (1883). — *Imperial Prolific.* Livingston, Cat. (1886). — *"Boston" Small Pea.* Vick, Cat. (1890). — *White Field.* Bull. Utah Exp. Sta. 20: 17. (1892). — *California Pea.* Bull. Mich. Exp. Sta. 144: 211. (1896). — *Haricot rond blanc commun.* Vilmorin-And. Cat. (1891). — *Buschbohne, Zucker Perl.* Haage & Sch. Haupt-Verz. (1876).

Phaseolus ellipticus saccharatus Moench, Martens, Gartenbohnen 66. (1860).

Field Columbian Museum, seeds, No. 13224, 15953, 26658: Philadelphia Commercial Museum, seeds, No. 10450, "Feijão branco," São Lourenço, Brazil; 10730, Mexico.

** Larger than the preceding.

† Seed black.

INDIAN CHIEF.* Plant strong and vigorous, climbing 3–4 ft. Leaflets 2½–3 in. long, 2–2½ in. broad, light green, often with purplish tinge, slightly wrinkled, rather thin. Blossoms purplish. Pods changing from green to yellow, 3–4½ in. long, ⅜–⅝ in. broad, nearly as thick, much curved; spur slender, curved, ¼ in. long. Seed black, 7/16–½ in. long, ⅜–7/16 in. broad, slightly or not at all flattened, oval to subglobose. First introduced into Europe from China about 1837 and into the United States about 1852. Moderately productive and medium early.— Plate 38, f. 18.

QUEEN.† Differs from the preceding only in seeds which are slightly larger and more nearly globose.— Plate 38, f. 19.

BLACK WAX.‡ A dwarf form of Indian Chief. Plant 8–10 in. high, strictly dwarf. Pods bright yellow. Seeds a little larger than the latter, otherwise identical.— Plate 38, f. 20.

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* Browne, Rept. U. S. Pat. Off. 337. (1854). — Burr, Field & Gard. Veg. 484. (1863). — [Wing], Rept. N. Y. Exp. Sta. **1**:97. (1882). — *Black Wax Pole.* Thorburn, Cat. (1883). — *Black Algerian.* Vilmorin-And. Veg. Gard. 58. (1885). — *Haricot d'Alger noir.* Vilmorin-And. Pl. Pot. 266. (1883). — *Stangenbohne, Wachs schwarze.* Haage & Sch. Haupt-Verz. (1880).

Phaseolus sphaericus niger Martens, Gartenbohnen 70. (1860).

Field Columbian Museum, seeds, No. 15954, 16522: Philadelphia Commercial Museum, seeds, No. 10500, Tacubaya, Federal District, Mexico; 10647, Vera Cruz, Mexico; 10648, "Frijol prieto," Texmelucan, Puebla, Mexico; 10656, "Frijol prieto," Celaya, Guanajuato, Mexico; 10914, Buenos Ayres, Argentina; 10983, Guatemala; 10984, Guatemala; 10985, Quezaltenango, Guatemala; 10986, Quezaltenango, Guatemala; 10989, Guatemala.

† *Stangenbohne, Königin Wachs.* Haage & Sch. Haupt-Verz. (1890).

Philadelphia Commercial Museum, seeds, No. 10911, Buenos Ayres, Argentina.

‡ *Dwarf Black Wax.* [Wing], Rept. N. Y. Exp. Sta. **1**:102. (1882). — *Challenge Black Wax.* Thorburn, Cat. (1895).

†† Seed white.

WHITE ALGERIAN.* Plant vigorous, climbing 4–5 ft. Stems and leafstalks light green. Leaflets $2\frac{1}{2}$–3 in. long, nearly as broad, light yellowish green, thin and papery. Blossoms white. Pods yellow, $3\frac{1}{2}$–$4\frac{1}{2}$ in. long, a little flattened, slightly curved; spur slender, curved, $\frac{1}{2}$ in. long. Seed dingy white, $\frac{3}{8}$–$\frac{1}{2}$ in. long, $\frac{1}{4}$–$\frac{3}{8}$ in. broad, ovate, not usually with truncated ends. A moderately productive but tender sort.—Plate 38, f. 21.

WHITE WAX.† Plant 8–12 in. high, occasionally producing a few runners, erect, stout, vigorous, few branched. Leaflets $2\frac{1}{2}$–$3\frac{1}{2}$ in. long, 2–$2\frac{1}{2}$ in. broad, often subtriangular, taper pointed, thin, slightly wrinkled. Blossoms white. Pods greenish yellow, 3–5 in. long, $\frac{1}{2}$–$\frac{5}{8}$ in. broad, $\frac{3}{8}$ in. thick; spur slender, $\frac{1}{2}$ in. long. Seed white, $\frac{3}{8}$–$\frac{5}{8}$ in. long, nearly as broad, a little flattened, irregularly oblong or elliptical, slightly wrinkled. A very old and productive variety.—Plate 38, f. 22.

MARROW.‡ Plant 12–16 in. high, strictly dwarf, vigorous, much branched, compact. Leaflets 3–$3\frac{1}{2}$ in. long, 2–$2\frac{1}{2}$ in.

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* *Tall White Algerian Butter Wax.* Vilmorin-And. Veg. Gard. 59. (1885). — *Golden Cluster.* Thorburn, Cat. (1887). — *Haricot beurre blanc à rames.* Vilmorin-And. Pl. Pot. 267. (1883). — *Stangenbohne, Wachs weisse.* Haage & Sch. Haupt-Verz. (1880).

Field Columbian Museum, seeds, No. 16515: Philadelphia Commercial Museum, seeds, No. 5095, "Frijoles blancos," Puriscal, Costa Rica; 5099, "Frijoles blancos," Puriscal, Costa Rica; 5507, "Frijoles blancos," Santa Ana, Escasu, Costa Rica.

† [Wing], Rept. N. Y. Exp. Sta. **1**: 101. (1882). — *White Round Wax.* Sibley, Cat. (1883). — *Dwarf White Algerian Butter.* Vilmorin-And. Veg. Gard. 65. (1885). — *Haricot beurre blanc nain.* Vilmorin-And. Pl. Pot. 273. (1883). — *Buschbohne, Wachs weisse,* etc. Haage & Sch. Haupt-Verz. (1880).

Phaseolus sphaericus pumilus Martens, Gartenbohnen 73. (1860).

‡ *White Marrow.* [Wing], Rept. N. Y. Exp. Sta. **1**: 105 (1882).— *Quarantain.* Vilmorin-And. Veg. Gard. 67. (1885). — *Haricot nain blanc Quarantain.* Vilmorin-And. Pl. Pot. 275. (1883). — *Buschbohne, Speck weisse dickfleischige.* Haage & Sch. Haupt-Verz. (1876).

broad, ovate to subtriangular, often elongated taper pointed, much wrinkled. Pods green, 3–5 in. long, $\frac{3}{8}$–$\frac{1}{2}$ in. broad, $\frac{1}{4}$–$\frac{3}{8}$ in. thick, slightly curved; spur nearly straight, $\frac{1}{2}$ in. long. Seed white, $\frac{3}{8}$–$\frac{5}{8}$ in. long, $\frac{1}{4}$–$\frac{3}{8}$ in. broad, uniformly oblong, abruptly rounding at the ends, very smooth, glossy. An early and quite productive variety. — Plate 39, f. 1.

Sophie.* Plant climbing, 3–4 ft. high, moderately vigorous, few leaved. Leaflets 3–$3\frac{1}{2}$ in. long, 2–$2\frac{1}{2}$ in. wide, slightly wrinkled. Blossoms white. Pods light green, $3\frac{1}{2}$–$4\frac{1}{2}$ in. long, $\frac{1}{2}$–$\frac{5}{8}$ in. wide, a little flattened, slightly curved, subtorulose; spur stout, straight, $\frac{1}{2}$ in. long. Seed white, somewhat irregular in size and shape, $\frac{3}{8}$–$\frac{1}{2}$ in. long, $\frac{1}{4}$–$\frac{3}{8}$ in. broad, nearly as thick, ovate to subspherical. A poor bearer but with large and tender pods. — Plate 39, f. 2.

†† Seed neither white nor black.

‡ One color.

Mont d'Or.† Plant climbing 3–4 ft., with few runners, moderately vigorous. Leaflets 2–$2\frac{1}{2}$ in. long, $1\frac{1}{2}$–2 in. broad, ovate to triangular, slightly or not at all wrinkled. Blossoms light pink or purplish. Pods bright yellow, 3–5 in. long, $\frac{3}{8}$–$\frac{1}{2}$ in. broad, $\frac{1}{4}$–$\frac{3}{8}$ in. thick, a little flattened, more or less curved; spur slender, curved, $\frac{1}{2}$ in. long. Seed dark reddish purple, darker around the hilum, $\frac{1}{2}$–$\frac{5}{8}$ in. long, $\frac{5}{16}$–$\frac{3}{8}$ in. broad, $\frac{1}{4}$–$\frac{5}{8}$ in. thick, quite uniformly ovate.

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* Gard. Chron. **2**: 236. (1842). — *White Cranberry*. [Wing], Rept. N. Y. Exp. Sta. **1**: 99. (1882). — Vilmorin-And. Veg. Gard. 57. (1885). — *Stangenbohne*, *Dukaten*. Haage & Sch. Haupt-Verz. (1899). — *Golden Andalusia*. Thorburn, Cat. (1897). — *Lazy Wives*. Greiner, How to Make Gard. Pay 154. (1900).

Phaseolus sphaericus albus Martens, Gartenbohnen 72. (1860).

Field Columbian Museum, seeds, No. 430: Philadelphia Commercial Museum, seeds, No. 10511, Buenos Ayres, Argentina.

† [Wing], Rept. N. Y. Exp. Sta. **1**: 102. (1882). — Vilmorin-And. Veg. Gard. 59. (1885). — *Golden Butter*. Sibley, Cat. (1884). — *Haricot beurre du Mont d'Or*. Vilmorin-And. Pl. Pot. 267. (1883).

Very early and productive. Originated in Germany about 1875. — Plate 39, f. 3.

Dwarf Mont d'Or.* Plant 10–12 in. high, strictly dwarf. Leaflets 1½–2 in. long, 1–2 in. broad, light green, rough but not wrinkled, quite thick, variable in shape. Blossoms pink or purplish. Pods pale yellow, 3–4 in. long, ⅜–⅝ in. broad, subterete, slightly curved; spur straight, stout, ½ in. long. Seed dark brown to violet, black around the hilum, ⅜–½ in. long, ¼–⅝ in. thick, ovate, uniform in size and shape. — Plate 39, f. 4.

Cherry.† Plant identical with Mont d'Or. Blossoms light pink or nearly white. Pods green, 3–5 in. long. Seed reddish brown, shaped like the preceding but a little larger. — Plate 39, f. 5.

Dwarf Cherry.‡ Plant identical with Dwarf Mont d'Or. Otherwise as in the preceding.

Yellow Princess.§ Plant strictly dwarf, 10–12 in. high, moderately vigorous. Leaflets 3–3½ in. long, 2–2½ in. broad, taper pointed, very slightly wrinkled. Pods yellow, 3–5 in. long, ½–⅝ in. broad, nearly as thick, slightly curved; spur quite stout, ½ in. long. Seed yellowish

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* [Wing], Rept. N. Y. Exp. Sta. **1**: 102. (1883). — Vilmorin-And. Veg. Gard. 65. (1885). — *Haricot nain du Mont d'Or.* Vilmorin-And. Pl. Pot. 273. (1883).

Philadelphia Commercial Museum, seeds belonging to this or the preceding variety, No. 10800, Caucasus Agric. Society, Russia; 10897, State of Entre Rios, Argentina; 10900, Buenos Ayres, Argentina; 10906, Buenos Ayres, Argentina; 10910, Buenos Ayres, Argentina; 10948, Valladolid, Spain.

† *Stangenbohne, Kirsch.* Haage & Sch. Haupt-Verz. (1876). *Phaseolus sphaericus purpureus* Martens, Gartenbohnen 71. (1860).

‡ *Buschbohne, Kirsch.* Haage & Sch. Haupt-Verz. (1891). — *Buschbohne, weichselfarbige.* Haage & Sch. Haupt-Verz. (1892).

Philadelphia Commercial Museum, seeds belonging to this or the preceding variety, No. 10498, Buenos Ayres, Argentina.

§ *Buschbohne, Princess gelbe runde.* Haage & Sch. Haupt-Verz. (1873). — *Buschbohne, Nonpareil.* Haage & Sch. Haupt-Verz. (1892.)

Philadelphia Commercial Museum, seeds, No. 10893, Tucuman, Argentina; 10980, "Frijol redondo colorado," Sacatepéquez, Guatemala.

brown, $\frac{3}{8}$–$\frac{5}{8}$ in. long, $\frac{1}{4}$–$\frac{3}{8}$ in. broad, nearly as thick, with dark ring around the hilum. — Plate 39, f. 6.

YELLOW CANADA.* Plant strictly dwarf, 12–15 in. high. Leaflets 3–3$\frac{1}{2}$ in. long, 2$\frac{3}{4}$ in. broad, deep green, considerably wrinkled. Blossoms light pink. Pods rather late in turning yellow, 3–4 in. long, straight or nearly so. Seed deep yellow, with prominent brownish veiny markings and darker around the hilum, $\frac{3}{8}$–$\frac{1}{2}$ in. long, $\frac{1}{4}$–$\frac{3}{4}$ in. thick, ovate to subcylindric. — Plate 39, f. 7.

SIX WEEKS.† Identical with Yellow Canada except the pods green, seeds slightly darker, and maturing several days earlier.— Plate 39, f. 8.

GOLDEN CRANBERRY.‡ Plant strictly dwarf, 12–15 in. high, much branched. Leaflets 2–2$\frac{1}{2}$ in. long, nearly as

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* *Early Yellow Canada.* Vilmorin-And. Veg. Gard. 63. (1885). — *Haricot jaune du Canada.* Vilmorin-And. Pl. Pot. 271. (1873). — *Buschbohne, fleischfarbige.* Haage & Sch. Haupt-Verz. (1878).

Phaseolus sphaericus luteus Martens, Gartenbohnen 72. (1860).

Philadelphia Commercial Museum, seeds, No. 10716, Chiantla, State of Puebla, Mexico; 10883, "Porates alvergillo," Concepcion, San Juan, Argentina.

† *Early Yellow Six Weeks.* Browne, Rept. U. S. Pat. Off. 336. (1854). — *Round Yellow Six Weeks.* Burr, Field & Gard. Veg. 472. (1863). — [Wing], Rept. N. Y. Exp. Sta. **2**: 255. (1883). — Vilmorin-And. Veg. Gard. 52. (1885). — *Buschbohne, früheste 6 Wochen.* Haage & Sch. Haupt-Verz. (1870).— *Haricot jaune hâtif de six semaines.* Vilmorin-And. Pl. Pot. 259. (1883).

Philadelphia Commercial Museum, seeds, No. 6057, "Frijoles bayos chicos," Chile; 10457, Tucuman, Argentina.

‡ Burr, Field & Gard. Veg. 463. (1863). — [Wing], Rept. N. Y. Exp. Sta. **1**: 99. (1884).— *Oval Yellow China* or *Robin's Egg.* Vilmorin-And. Veg. Gard. 64. (1885).— *Haricot jaune de la Chine.* Vilmorin-And. Pl. Pot. 272. (1883). — *Buschbohne, chinesische.* Haage & Sch. Haupt-Verz. (1880).

Phaseolus sphaericus sulfureus Martens, Gartenbohnen 72. (1860).

Field Columbian Museum, seeds, No. 439: Philadelphia Commercial Museum, seeds, No. 3007, Hungary; 10453, "Porates amarillos de la China," State of Santa Fé, Argentina; 10454, Gov't. of Siedlets, Russia; 10884, "Porates amarillos de la China," Buenos Ayres, Argentina; 10456, "Frijoles amarillos redondos," Santa Ana, Costa Rica.

broad, abruptly pointed, slightly wrinkled, quite thin. Blossoms white. Pods green, $2\frac{1}{2}$–$3\frac{1}{2}$ in. long, $\frac{3}{8}$–$\frac{1}{2}$ in. broad, $\frac{1}{4}$ in. thick, straight or nearly so; spur short, stout, nearly straight. Seed sulphurous yellow, with light line around hilum and brownish veiny markings, $\frac{3}{8}$–$\frac{1}{2}$ in. long, subovate, uniformly smooth and regular. Said to be universally cultivated. — Plate 39, f. 9.

‡‡ Seed variegated, but with no white markings.

ZEBRA.* Plant climbing 5–6 ft., extremely vigorous. Leaflets 3–4 in. long, $2\frac{1}{2}$–$3\frac{1}{2}$ in. broad, slightly wrinkled. Blossoms white, tinged with lilac. Pods green, faintly purplish violet tinged, 3–5 in. long, $\frac{1}{2}$–$\frac{5}{8}$ in. broad, much flattened, nearly straight; spur stout, straight, $\frac{1}{2}$ in. long. Seeds reddish brown, faintly splashed with a lighter shade, more or less solidly striped with black, $\frac{7}{16}$–$\frac{9}{16}$ in. long, $\frac{5}{16}$–$\frac{3}{8}$ in. broad, ovate. — Plate 39, f. 10.

HORTICULTURAL.† Plant climbing 3–4 ft., with few run-

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* *Gray Zebra Runner.* Vilmorin-And. Veg. Gard. 62. (1885). — *Haricot zébre gris à rames.* Vilmorin-And. Pl. Pot. 270. (1883).

† Burr, Field & Gard. Veg. 483. (1863). — [Wing], Rept. N. Y. Exp. Sta. **1**: 95. (1882). — *Horticultural* or *Speckled Cranberry.* Thorburn, Cat. (1883). — *New Zealand Runner.* Vilmorin-And. Veg. Gard. 57. (1885). — *Haricot de Prague marbré.* Vilmorin-And. Pl. Pot. 265. (1883). *Phaseolus sphaericus haematocarpus* Savi, Martens, Gartenbohnen 75. (1860).

Field Columbian Museum, seeds belonging to this or the three following varieties, Nos. 435, 437, 1789, Japan: Philadelphia Commercial Museum, No. 3014, "Bab," Hungary; 3017, "Bab," Hungary; 3022, "Bab," Hungary; 5096, "Frijoles de Color," San Ramon, Costa Rica; 5509, "Frijoles porates," Santa Ana, Escasu, Costa Rica; 10801, Caucasus Agric. Society, Russia; 10475, Japan; 10476, Leon, Spain; 10478, Varna, Bulgaria; 10480, Brazil; 10551, Medina del Campo, Spain; 10552, "Frijol curedavor," Sacatepéquez, Guatemala; 10746, "Zicen," "Nozura," Japan; 10782, Harkavo, Bulgaria; 10846, "Coco marbre," State of Santa Fé, Argentina; 10891, "Porates balines romanes," Buenos Ayres, Argentina; 10901, Buenos Ayres, Argentina; 10950, Lograno, Spain.

The following are small forms of Horticultural group: No. 5501, "Frijoles porates," Santa Ana, Escasu, Costa Rica, 5542, "Frijoles porates," Atenas, Costa Rica; 10949, Medina del Campo, Spain.

ners. Leaflets deep green, 2–3 in. long, nearly as broad, rather thick, slightly wrinkled. Blossoms white, becoming deeply tinged with lilac. Pods light green, becoming crimson with purple and green blotches, 3–5 in. long, $\frac{3}{8}$–$\frac{5}{8}$ in. broad, flattened, subtorulose, straight or nearly so; spur stout, $\frac{1}{2}$ in. long. Seed $\frac{7}{16}$–$\frac{9}{16}$ in, long, $\frac{5}{16}$–$\frac{3}{8}$ in. broad, nearly as thick, light brown or dun, spotted and striped with dark red, a darker line around the hilum. Introduced into Europe about the middle of the eighteenth century and into the United States from England about 1825. — Plate 39, f. 11.

Spotted Wax.* Identical with the preceding except that the pods are yellow. — Plate 39, f. 12.

Dwarf Horticultural.† Identical with the preceding except that the plant is strictly dwarf, compact, 10–12 in. high, and earlier. A popular sort.

Horticultural Wax.‡ Identical with the preceding except that the pods are bright yellow and seed dull red with splashes of yellow.— Plate 39, f. 13.

‡‡‡ More or less marked with white.

Corn Bean.§ Plant climbing 3–4 ft., with few runners. Leaflets broadly ovate, the larger ones usually broader than long, 4–5 in. long, 5–5½ in. broad, abruptly pointed, quite smooth. Blossoms white, blotched with purple. Pods green, 3–4 in. long, $\frac{3}{8}$ in. wide, nearly as thick, straight or nearly so; spur slender, $\frac{1}{4}$ in. long. Seed uniform in size, $\frac{3}{8}$ in. long, $\frac{5}{16}$ in. broad, $\frac{1}{4}$ in. thick, finely splashed with

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* Haage & Sch. Seed.

† Burr, Field & Gard. Veg. 458. (1863). — *Intermediate Horticultural.* [Wing], Rept. N. Y. Exp. Sta. **1**: 96. (1882). — *Pink-marbled Dwarf Prague.* Vilmorin-And. Veg. Gard. 63. (1885). — *Haricot de Prague marbré nain.* Vilmorin-And. Pl. Pot. 271. (1883).
Phaseolus sphaericus minor Martens, Gartenbohnen 74. (1860).

‡ *Buschbohne, Wachs rothbunte.* Haage & Sch. Haupt-Verz. (1870).

§ Burr, Field & Gard. Veg. 482. (1863). — *Cut Short* or *Corn Hill.* Thorburn, Cat. (1894).

white and chocolate brown, solid chocolate brown along the edges, one or both ends much flattened. Slight resemblance to corn. Said to be planted in hills of corn, the stalks of the latter being used as poles. Moderately productive.— Plate 39, f. 14.

GOLDEN WAX.* Plant 8–10 in. high, strictly dwarf. Leaflets 2½–3 in. long, 2–3 in. broad, thick, rough, scarcely wrinkled. Blossoms white. Pods yellow, 3–4 in. long, ¼–⅜ in. thick, slightly curved; spur stout, curved, ½ in. long. Seed ⅜–½ in. long, ¼–⅜ in. broad, nearly as thick, white, blotched with shades of purplish brown on ventral surface and a few scattered spots. A very popular sort.— Plate 39, f. 15.

aaa. **Seed longer than the preceding but not more than twice as long as broad.**

† **One color.**

* **White.**

INTESTIN.† Plant climbing 5–6 ft., vigorous. Leaflets 3–3½ in. long, 2–3 in. broad, deep green, thin, a little wrinkled. Blossoms white. Pods green, turning to yellow quite late, 3–4 in. long, ⅜–½ in. wide, usually greater in thickness; spur slender, slightly curved, ½ in. long. Seed an ivory white, ½–⅝ in. long, ¼–5/16 in. broad, nearly as thick, dented or compressed at one side of hilum, pushing the latter to the opposite side. Quite late, but of good quality.— Plate 39, f. 16.

WHITE VALENTINE.‡ Identical with the preceding except that the plant is strictly dwarf, 8–10 in. high, and outer skin of seed has tendency to wrinkle. Introduced about 1870.—Plate 39, f. 17.

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* Thorburn, Cat. (1884). *Buschbohne, Comet Wachs.* Haage & Sch. Haupt-Verz. (1898).

Phaseolus sphaericus dimidiatus Martens, Gartenbohnen 76. (1860).

Field Columbian Museum, seeds, No. 1787, Japan.

† *Broad Pod.* Vilmorin-And. Veg. Gard. 56. (1885).—*Haricot intestin.* Vilmorin-And. Pl. Pot. 263. (1883).

‡ Thorburn, Cat. (1877).—[Wing], Rept. N. Y. Exp. Sta. 2:252. (1883).

White Asparagus.* Plant vigorous, climbing 3–4 ft., with few runners. Leaflets 1½ in. long, bright green, slightly wrinkled, quite thick. Blossoms white. Pods green or yellowish green, 3–4 in. long, ⅜–½ in. broad, subterete; spur slender, curved, ¼ in. long. Seed dingy white, irregularly ovate, ⅜–½ in. long, ¼–5/16 in. broad, a little wrinkled. — Plate 39, f. 18.

Edible Pod.† Plant strictly dwarf, 12–15 in. high, stout, much branched. Leaflets 3–3½ in. long, 2½–3 in. broad, yellowish green, considerably wrinkled. Blossoms white. Pods light green, 3–5 in. long, ⅜–⅝ in. broad, nearly as thick, much curved; spur slender, nearly straight. Seed snow white, with well-defined but faint line about the hilum, 7/16–9/16 in. long, ¼–5/16 in. broad, terete, oblong, scarcely tapering toward ends. Very productive and of good quality. — Plate 39, f. 19.

Long Princess.‡ Differs from the preceding only in color and shape of seeds which are dingy white, and with no line around the hilum, tapering, and slightly wrinkled. — Plate 39, f. 20.

** Black.

Early Negro.§ Plant strictly dwarf, 12–15 in. high. Leaflets 3–4 in. long, 2½–3 in. broad, yellowish green, but

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* *Stangenbohne, Spargel* oder *Zucker.* Haage & Sch. Haupt-Verz. (1876). — *Haricot Quatre-a-quatre.* Vilmorin-And. Cat. (1896).

Philadelphia Commercial Museum, seeds, No. 5056, "Frijoles blancos," Dept. San Salvador, Salvador; 1075, Japan; 10509, "Frijol blanco," Sacatepéquez, Guatemala; 10726, "Frijol mantequilla," Jalisco, Mexico; 10728, Metztitlan, State of Hidalgo, Mexico; 10729, Guanajuato, Mexico; 10748, "Engen mame," Japan.

† *Early Dwarf White Edible-Podded.* Vilmorin-And. Veg. Gard. 66. (1885). — *Haricot nain blanc hâtif sans parchemin.* Vilmorin-And. Pl. Pot. 275. (1883).

‡ *Haricot Princesse nain à grosse cosse.* Vilmorin-And. Pl. Pot. 263. (1883).

§ *Buschbohne, früheste schwarze.* Haage & Sch. Haupt-Verz. (1873).

Philadelphia Commercial Museum, seeds, No. 1094, Japan; 5084, "Frijoles negros," San Ramon, Costa Rica; 5538, "Frijoles negros," Puris-

little wrinkled. Blossoms white, slightly tinged with purple. Pods green, 3–5 in. long, $\frac{3}{8}$–$\frac{1}{2}$ in. broad, slightly flattened, straight or nearly so; spur slender, slightly curved, $\frac{1}{2}$ in. long. Seed black or brownish black, $\frac{7}{16}$–$\frac{9}{16}$ in. long, $\frac{1}{4}$–$\frac{5}{16}$ in. broad, ovate, smooth. — Plate 39, f. 21.

CURRIE.* Plant strictly dwarf, 8–10 in. high. Leaflets light yellowish green, 3–3$\frac{1}{2}$ in. long, thin, a little rough but not wrinkled. Blossoms pale purple. Pods yellow, 4–5 in. long, $\frac{3}{8}$–$\frac{5}{8}$ in. broad, flattened, curved; spur straight, $\frac{1}{2}$ in. long. Seed black, $\frac{7}{16}$–$\frac{9}{16}$ in. long, $\frac{1}{4}$–$\frac{3}{8}$ in. broad, slightly compressed, subreniform. Very prolific. Originated about 1890.—Plate 39, f. 22.

CYLINDER.† Identical with the preceding except that the pods are subterete, 3–4 in. long, and the seeds less compressed and but little flattened on the ends.—Plate 39, f. 23

YOSEMITE.‡ Plant strictly dwarf, 10–12 in. high, much branched, spreading, leafy. Leaflets 3$\frac{1}{2}$–4 in. long, 2$\frac{1}{2}$–3 in. broad, light green, thick, rough but not wrinkled. Blossoms purplish. Pods light yellow, 4–6 in. long, subterete; spur medium stout, curved, $\frac{3}{4}$–1 in. long. Seed black, $\frac{1}{2}$–$\frac{5}{8}$ in. long, $\frac{1}{4}$–$\frac{5}{16}$ in. broad, ovate. Very productive and early. Originated about 1888. Its spreading habit requires more than the ordinary space in growing. —Plate 39, f. 24.

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cal, Costa Rica; 5548, "Frijoles negros," Ficafres, Costa Rica; 6190, "Frijoles negros," Dept. Masaja, Nicaragua; 6206, "Frijoles negros," Dept. Granda, Nicaragua; 10468, Navarro, State of Buenos Ayres, Argentina; 10504, "Frijoles negros pequeños," Santa Ana, Costa Rica; 10629, "Caraotas negras," Valencia, State of Carabobo, Venezuela; 10654, "Frijol prieto," Jalapa, Vera Cruz, Mexico; 10655, Tenancingo, State of Mexico, Mexico.

* *Currie's Rust Proof.* Thorburn, Cat. (1895).

† *Cylinder Black Wax.* Henderson, Cat. (1890).

‡ *Yosemite Mammoth.* Henderson, Cat. (1890). — *Burpee's Saddleback Wax.* Burpee, Cat. (1894).

*** Neither white nor black.

ORLEANS.* Plant strictly dwarf, 10–12 in. high. Leaflets yellowish green, 2½–3 in. long, 2–2½ in. broad, wrinkled, rather thick. Blossoms white with pink tinge. Pods green, 3–4 in. long, ½–⅝ in. broad, a little flattened; spur stout, straight, ½–⅝ in. long. Seed red to reddish brown, ⅜–½ in. long, ¼–5/16 in. broad, oblong, subovate, smooth, with rounded ends. Very productive, medium early.—Plate 40, f. 1.

SOUTHERN PROLIFIC.† Plant vigorous, climbing 3–4 ft. Leaflets deep green, 2–3 in. long, not wrinkled. Blossoms white. Pods green, 3–5 in. long, ⅜–½ in. broad, subterete, nearly straight; spur slender, curved, ¼ in. long. Seed dark dun or reddish brown, darker around the hilum, ⅜–½ in. long, ¼–5/16 in. thick, ovate-oblong, occasionally subreniform. Introduced about 1882.—Plate 40, f. 2.

HUNDREDFOLD.‡ Plant strictly dwarf, 8–12 in. high,

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* *Haricot rouge d'Orléans.* [Wing], Rept. N. Y. Exp. Sta. **2**: 255. (1883).

Philadelphia Commercial Museum, seeds, No. 10604, "Frijoles colorados pequeños," San Carlos, Costa Rica; 10681, Mexico; 10979, "Frijol colorado," Sacatepéquez, Guatemala; 10981, "Frijol colorado," Quezaltenango, Guatemala.

† [Wing], Rept. N. Y. Exp. Sta. **2**: 255. (1883). — *Stangenbohne, Don Carlos.* Haage & Sch. Haupt-Verz. (1892).

Field Columbian Museum, seeds, No. 16517: Philadelphia Commercial Museum, No. 5087, "Frijoles porates," Santa Ana, Escasu, Costa Rica; 5090, "Frijoles," Escasu, Costa Rica; 6199, "Frijoles morenos," Dept. Managua, Nicaragua.

‡ *Hundred for One.* [Wing], Rept. N. Y. Exp. Sta. **2**: 255. (1883).— *Dwarf Yellow Hundredfold.* Vilmorin-And. Veg. Gard. 52. (1885). — *Haricot jaune cent pour un.* Vilmorin-And. Pl. Pot. 259. (1883). — *Buschbohne, du bon jardinier.* Haage & Sch. Haupt-Verz. (1896). — *Buschbohne, Hundert für eine.* Haage & Sch. l. c.

Philadelphia Commercial Museum, seeds, No. 6217; "Frijol malaco," Dept. Matagalpa, Nicaragua; 10484, "Frijoles bayos grandes," Pacaca, Costa Rica; 10605, "Frijoles bayos medianos," Santa Ana, Costa Rica; 10606, "Frijoles bayos pequeños," Santa Ana, Costa Rica; 10781, Pazardjik, Bulgaria; 10820, Pernambuco, Brazil; 10826, Brazil; 10975, "Frijol amarillo," Sacatepéquez, Guatemala.

compact. Leaflets deep green, 3–4 in. long, 2–3 in broad, considerably wrinkled. Blossoms white. Pods green, 3–4½ in. long, ¼–⅜ in. broad, subterete, curved; spur stout, curved, ½ in. long. Seed variegated, reddish or yellowish brown in various shades, darker around the hilum, ⅜–7/16 in. long, 3/16–¼ in. broad, ovate, oblong, usually with truncated ends. Moderately productive.—Plate 40, f. 3.

Barbes.* Identical with the preceding except that the seeds are somewhat larger and lighter in color.—Plate 40, f. 4.

Digoin.† Differs from the preceding only in having yellow pods.—Plate 40, f. 5.

White Pod.‡ Plant strictly dwarf, 10–12 in. high. Leaflets often broader than long, 2½–3 in. long, deep green, not wrinkled. Blossoms white. Pods grayish white with green along the edges, 3–4½ in. long, ⅜–½ in. broad, slightly flattened, curved; spurs slender, curved, ½ in. long. Seed reddish or yellowish-brown, darker around the hilum, ⅜–½ in. long, 3/16–¼ in. thick, ovate-oblong. —Plate 40, f. 6.

Rob Roy.§ Plant 12–15 in. high, producing few runners a foot long. Leaflets deep green, 3–3½ in. long, 2–2½ in. broad, smooth. Blossoms white with purplish tinge. Pods green, 3–3½ in. long, ¼–⅜ in. thick, slightly curved; spurs stout, straight, ½ in. long. Seed light or creamy yellow, with dark ring around hilum, ½–9/16 in. long, ¼–5/16 in broad, 3/16–¼ in. thick; ventral edge straight, rounded on dorsal edge. — Plate 40, f. 7.

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* *Dwarf Barbes.* Vilmorin-And. Veg. Gard. 53. (1885). — *Haricot Barbes nain.* Vilmorin-And. Pl. Pot. 260. (1883). — *Buschbohne, Barbes nain amélioré.* Haage & Sch. Haupt-Verz. (1891).

† *Haricot beurre nain de Digoin.* Vilmorin-And. Cat. (1898)

‡ *Gray Seeded.* [Wing], Rept. N. Y. Exp. Sta. **2**: 250. (1883). — *Buschbohne, Zucker, Spargel.* Haage & Sch. Haupt-Verz. (1891).

§ Burr, Field & Gard. Veg. 472. (1863).

Philadelphia Commercial Museum, seeds, No. 10455, "Cuarentona amarilla," State of Carabobo, Venezuela.

RUSSIAN.* Plant 12–15 in. high, strictly dwarf, exceedingly vigorous. Leaflets yellowish green, 3½–4 in. long, 3–3½ in. broad, finely wrinkled. Blossoms purplish. Pods light green, 4–5½ in. long, ⅜–½ in. broad, subterete, straight or nearly so; spur straight, slender, ½ in. long. Seed light dun with heavy dark line around hilum, 9/16–⅝ in. long, 5/16 in. broad, ovate, not usually reniform. Distinct because of the absence of the polish or gloss color of other varieties. — Plate 40, f. 8.

SIR JOSEPH PAXTON.† Plant strictly dwarf, 12–15 in. high, erect, branchy. Leaflets 2½–3 in. long, 2–2½ in. broad, scarcely wrinkled. Blossoms white with slight trace of pink. Pods green, 4–6 in. long, 7/16–9/16 in. broad, straight or a little bent; spur stout, nearly straight, ¼ in. long. Seed a shining red or dark dun, 7/16–9/16 in. long, ¼–5/16 in. broad, subovate to oblong, with rounded ends. Medium early and very productive. Originated in England about 1870. — Plate 40, f. 9.

BROWN HOLLAND.‡ Plant strictly dwarf, 10–12 in. high, branchy, vigorous. Leaflets light green, 5–5½ in. long, 4–4½ in. broad, rough, but not wrinkled. Blossoms

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* *Russian Dwarf.* Vilmorin-And. Veg. Gard. 50. (1885). — *Haricot russe.* Vilmorin-And. Pl. Pot. 257. (1883).

† Vilmorin-And. Veg. Gard. 54. (1885). — *Buschbohne, holländische frühe gelbe Treib.* Haage & Sch. Haupt-Verz. (1878).

Field Columbian Museum, seeds, No. 26659: Philadelphia Commercial Museum, seeds, No. 3016, "Bab," Hungary; 5080, "Frijol Chileno," Santa Ana, Escasu, Costa Rica; 5516, "Frijoles colorados," Santa Eulalia, Costa Rica; 5540, "Frijoles," Puriscal, Costa Rica; 10486, Tenango, State of Mexico; 10487, Montevideo, Uruguay; 10488, Montevideo, Uruguay; 10493, "Frijoles porates ocres," Santo Domingo, Heredia, Costa Rica; 10494, "Frijoles colorados grandes," Santa Ana, Costa Rica; 10610, "Frijoles colorados medianos," San Carlos, Costa Rica; 10611, "Frijoles ocres grandes," Santo Domingo, Costa Rica; 10619, State of Miranda, Venezuela; 10671, Metztitlan, State of Hidalgo, Mexico; 10684, "Frijol amarillo," Tlaxcala, Mexico; 10693, "Frijol menudo," Quantillan, Mexico; 10974, Guatemala.

‡ *Buschbohne, holländische kaffeebraune.* Haage & Sch. Haupt-Verz. (1876).

white, often with traces of purple. Pods green, 4–5 in. long, $\frac{3}{8}$–$\frac{1}{2}$ in. broad, subterete, slightly curved. Seed dark chocolate or coffee brown, with dark ring around the hilum, $\frac{1}{2}$–$\frac{5}{8}$ in. long, $\frac{5}{16}$–$\frac{3}{8}$ in. broad, ovate-oblong, often subreniform, occasionally with truncated ends. — Plate 40, f. 10.

STRINGLESS.* A subvariety of the preceding with decidedly thicker pods and seeds. — Plate 40, f. 10.

†† Seed variegated.

‡ No white markings.

REFUGEE.† Plant strictly dwarf, 9–12 in. high, with few branches. Leaflets light green, 3–3$\frac{1}{2}$ in. long, 2–2$\frac{1}{2}$ in. broad, smooth and thin. Blossoms purplish. Pods green blotched with purple, 3–5 in. long, $\frac{3}{8}$–$\frac{1}{2}$ in. broad, subterete, curved; spur stout, curved, $\frac{1}{2}$ in. long. Seed dark brown splashed and dotted with yellow, $\frac{7}{16}$–$\frac{9}{16}$ in. long, $\frac{1}{4}$–$\frac{5}{16}$ in. broad, nearly as thick, usually tapering from the middle, rounded at ends. — Plate 40, f. 12.

REFUGEE WAX.‡ Identical with the preceding except that the pods are yellow.

OSBORN.§ Plant strictly dwarf, 9–12 in. high, branchy, compact, vigorous. Leaflets light green, 3–3$\frac{1}{2}$ in. long,

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* *Stringless Green Pod.* Thorburn, Cat. (1898).

Philadelphia Commercial Museum, seeds, No. 10678, Morelia, Mexico; 10679, Mexico; 10690, Temascaltepec, State of Mexico, Mexico; 10709, Hochinilco, Federal District, Mexico; 10902, Buenos Ayres, Argentina.

† Burr, Field & Gard. Veg. 470. (1863). —*Refugee* or *Thousand to One.* Browne, Rept. U. S. Pat. Off. 337. (1854). — [Wing], Rept. N. Y. Exp. Sta. **1**: 111. (1882).

‡ Thorburn, Cat. (1892).

Phaseolus oblongus turcicus Savi, Martens, Gartenbohnen 54. (1860).

Philadelphia Commercial Museum, seeds belonging to this or the preceding variety, No. 10990, Illinois.

§ *Osborn's Early Forcing.* Vilmorin-And. Veg. Gard. 54. (1885). — *Emile.* Thorburn, Cat. (1883).

Philadelphia Commercial Museum, seeds, No. 5082, "Frijoles porates del Brazil," Escasu, Costa Rica; 5091, "Frijoles porates," Santa Ana,

2–2½ in. broad. Blossoms white, tinged with purple. Pods green, 3–5 in. long, ⅜–½ in. broad, often slightly thicker, straight or nearly so; spur curved, ½–¾ in. long. Seed dark brown spotted and splashed with lighter brown, 7/16–9/16 in. long, ¼–5/16 in. broad, ovate-oblong, with rounded ends. A very early and productive variety, especially valuable for forcing. —Plate 40, f. 13.

Warwick.* Differs from the preceding only in color of seed, which is a bright red splashed with yellow. —Plate 40, f. 14.

Sion House.† Plant 12–15 in. high, producing a few runners, inclined to trail slightly. Leaflets deep green, 3–3½ in. long, 2½–2¾ in. broad, scarcely wrinkled, rather thin. Blossoms white blotched with lilac. Pods green becoming more or less splashed with purple, 3–5 in. long, ½–⅝ in. broad, ¼–⅜ in. thick, straight or nearly so; spur slender, ½ in. long. Seed reddish yellow dotted and splashed with a darker red, and a brownish ring around the hilum, ½–⅝ in. long, 5/16–⅜ in. broad, 3/16–¼ in. thick, usually rounded at ends. —Plate 40, f. 15.

Escasu, Costa Rica; 5092, "Frijoles porates del Brazil," Escasu, Costa Rica; 5513, "Frijoles," Escasu, Costa Rica; 5515, "Frijoles porates," Santa Ana, Escasu, Costa Rica; 10481, São Lourenço, Brazil; 10482 Metztitlan, State of Hidalgo, Mexico; 10903, Buenos Ayres, Argentina; 10945, Medina del Campo, Spain; 10973, Guatemala.

* *Early Warwick.* Henderson, Cat. (1891).

Philadelphia Commercial Museum, seeds, No. 5541, "Frijoles chingos morados," Santo Clario, Puriscal, Costa Rica; 10624, "Caraotas encarnadas," Cuaranteno, State of Carabobo, Venezuela; 10628, "Tapiramos," State of Carabobo, Venezuela; 10741, "Saito," Iwate Agric. Institute, Japan.

† *Best of All.* [Wing], Rept. N. Y. Exp. Sta. **1**: 108. (1882). — *Sion House.* Vilmorin-And. Veg. Gard. 49. (1885). — *Haricot turc.* Vilmorin-And. Pl. Pot. 257. (1883).

Field Columbian Museum, seeds, No. 11385: Philadelphia Commercial Museum, seeds, No. 452, Mossamedes, Angola, W. Africa; 3006, "Bab," Hungary; 5078, "Frijoles," Puriscal, Costa Rica; 10603, Dembos, Angola, W. Africa; 10637, "Cuarentona rosada," State of Carabobo, Venezuela; 10889, Corrientes, Argentina.

HINRICH.* Identical with the preceding except that the seed is a lighter yellow obscurely blotched with reddish. — Plate 40, f. 16.

‡‡ More or less marked with white.

IMPROVED HINRICH.† Differs from the preceding only in seed, which is white, faintly splashed with yellow. — Plate 40, f. 17.

BICOLOR.‡ Plant climbing 3–5 ft., with few runners. Leaflets deep green, 2½–3 in. long, 2–2½ in. broad, considerably wrinkled, thick. Blossoms white. Pods green, 3–5 in. long, ⅜–⅝ in. broad, subterete, slightly curved; spur slender, curved, ½ in. long. Seed snow white on dorsal half or a little more, reddish yellow on ventral part, the line separating the two colors continuous, a little striped and spotted on all parts, ½–⅝ in. long, 5/16–⅜ in. broad, ¼–5/16 in. thick, usually truncated at one end, rounded at the other, tapering gradually to the rounded end. — Plate 40, f. 18.

DETROIT.§ Plant identical with Golden Wax. Pods brighter yellow, often tinged with green. Seed slightly marked and darker, and distinctly longer in proportion to width. — Plate 40, f. 19.

PINKEYE.‖ Differs from the preceeding only in the pinkish color of markings.

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* *Buschbohne, Zucker, Hinrich's Riesen.* Haage & Sch. Haupt-Verz. (1880).

† *Buschbohne, Zucker, Hinrich's Riesen, verbesserte.* Haage & Sch. Haupt-Verz. (1891).

‡ *Haricot Coco bicolor prolifique.* Vilmorin-And. Cat. (1889). Field Columbian Museum, seeds, No. 13226: Philadelphia Commercial Museum, No. 10641, "Caraotas pintadas de amarillo," Venezuela.

§ Thorburn, Cat. (1890). — Waugh, Bull. Okla. Exp. Sta. 9: 7. (1893). — *Black-Eyed Wax.* Henderson, Cat. (1891).

‖ Thorburn, Cat. (1898). — *Buschbohne, Goldenregen.* Haage & Sch. Haupt-Verz. (1899).

EARLY CHINA.* Plant identical with Golden Wax. Pods yellowish-green, often 5 in. long. Seed white on about half the dorsal area, various shades of pink on ventral half, $\frac{7}{16}$—$\frac{9}{16}$ in. long, $\frac{1}{4}$—$\frac{5}{16}$ in. wide, oblong, slightly flattened.—Plate 40, f. 20.

KEENEY.† Plant 6–8 in. high, with a tendency to trail and to produce short tendrils. Pods 4–6 in. long. Seed white on one-third of posterior side, reddish brown on the other portion, otherwise identical with Golden Wax.—Plate 40, f. 21.

RACHEL.‡ Plant strictly dwarf, 12–15 in. high, vigorous. Leaflets yellowish green, 3–3½ in. long, 2½–3 in. broad, not wrinkled. Blossoms white. Pods green, 4–5 in. long, $\frac{3}{8}$—$\frac{1}{2}$ in. broad, $\frac{1}{4}$ in. thick, straight or nearly so; spur slender, curved, $\frac{1}{2}$ in. long. Seed chocolate brown with white and brown spots on one end, dark around the hilum, $\frac{1}{2}$—$\frac{9}{16}$ in. long, $\frac{5}{16}$ in. broad, oblong, rounded at ends. Very productive.—Plate 40, f. 22.

aaaa. Seed at least twice as long as broad.

* One color.

† White.

WHITE SWISS.§ Plant strictly dwarf, 12–15 in. high. Leaflets yellowish green, 3–3½ in. long, 2–2½ in. broad, quite thick, smooth. Blossoms white. Pods green, 3–5 in. long, $\frac{1}{2}$—$\frac{9}{16}$ in. broad, subterete, straight or nearly so; spur slender, curved, 1 in. long. Seed snow white, $\frac{5}{8}$—$\frac{3}{4}$ in. long, $\frac{1}{4}$—$\frac{5}{16}$ in. broad, uniformly oblong, truncated. Quite late but very productive.—Plate 40, f. 23.

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* Browne, Rept. U. S. Pat. Off. 336. (1854).—Burr, Field & Gard. Veg. 160. (1863).—[Wing], Rept. N. Y. Exp. Sta. **1**: 103. (1882).—*China Red Eye.* Waugh, Bull. Okla. Exp. Sta. 9: 8. (1893).
Philadelphia Commercial Museum, seeds, No. 10472, "Anego," Japan.

† *Keeney Rustless Golden Wax.* Burpee, Cat. (1895).

‡ *Early Rachel.* [Wing], Rept. N. Y. Exp. Sta. **1**: 107. (1882).
Phaseolus oblongus Rachelianus Martens, Gartenbohnen 59. (1860).

§ *White Swiss* or *Common White Canterbury.* Vilmorin-And. Seed.

WHITE KIDNEY.* Plant strictly dwarf, 12–15 in. high, bushy. Leaflets light green, 3–3½ in. long, 2½–3 in. broad, scarcely wrinkled, quite thick and stiff. Blossoms white. Pods green, 3–5 in. long, ⅜–⅝ in. broad, ¼ in. thick, straight or nearly so; spur stout, nearly straight, ⅝ in. long. Seed white, pale yellow about the hilum, ⅝–¾ in. long, ¼–⅜ in. broad, ⅛–¼ in. thick, strongly reniform. A very old and quite productive variety.— Plate 40, f. 24.

MAINE.† Plant strictly dwarf, 8–10 in. high, with few branches. Leaflets yellowish green, 3¼–3¾ in. long, 2¼–2½ in. broad, quite smooth, thick. Blossoms white. Pods green, 2½–3½ in. long, ⅜–⅝ in. broad, ¼ in. thick, greatly curved; spur slender, curved, ⅝ in. long. Seed snow white, 7/16–½ in. long, ¼ in. broad, subcylindrical or slightly reniform, usually flattened at ends. In general resembles Davis, but a little smaller.— Plate 41, f. 1.

DAVIS.‡ Plant 9–14 in. high, usually producing a few runners a foot long, vigorous, much branched. Leaflets 3–3½ in. long, 2–2½ in. broad, quite thin. Blossoms white. Pods greenish yellow, later becoming bright yellow, 4–5 in. long, ½–⅝ in. broad, ¼ in. thick, more or less curved; spur straight or nearly so, medium stout, ½–⅝ in. long. Seed white, ½–⅝ in. long, ¼ in. broad, oblong, rounded or slightly pointed at ends, sometimes slightly kidney shaped. A moderate bearer, but of excellent quality.— Plate 41, f. 2.

WHITE FLAGEOLET.§ Plant strictly dwarf, 12–15 in. high,

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* *Large White Kidney* or *Royal Dwarf.* Browne, Rept. U. S. Pat. Off. 337. (1854). — *White Kidney.* Burr, Field & Gard. Veg. 478. (1863). — *Royal Dwarf White.* Vilmorin-And. Veg. Gard. 48. (1885). — *Haricot Suisse blanc.* Vilmorin-And. Pl. Pot. 255. (1883). — *Buschbohne, Dattel* oder *Nieren weisse.* Haage & Sch. Haupt-Verz. (1895). *Phaseolus oblongus albus* Martens, Gartenbohnen 53. (1860).

† *Extra Early Maine.* Thorburn, Cat. (1890).

‡ *Davis Wax.* Burpee, Cat. (1896). — *King of the Wax.* Vilmorin-And. Seed.

§ Burr, Field & Gard. Veg. 477. (1863). — [Wing], Rept. N. Y. Exp. Sta. 1 : 106. (1882). — *Dwarf White Flageolet* or *White Canterbury.* Vil-

erect, vigorous, much branched. Leaflets yellowish green, 3½–4 in. long, 2–3 in. broad, thin and papery, scarcely wrinkled. Blossoms white. Pods light green, 4½–5½ in. long, ⅜–⅝ in. broad, a little flattened, curved; spur slender, curved, ½ in. long. Seed white, ½–¾ in. long, ⅜ in. broad, ¼ in. thick, subreniform, with depressed hilum.— Plate 41, f. 3.

Long Flageolet.* Differs from the preceding only in having decidedly longer pods, and slightly larger and longer seeds.— Plate 41, f. 4.

White Flageolet Wax.† Identical with White Flageolet except that the edible pods are bright yellow and much more tender. It is therefore a better variety for use in the green state. Originated in Germany about 1897 and is evidently not in the American trade at the present time.

Étampes.‡ Plant 10–12 in. high, erect, compact, sometimes producing a few short runners. Leaflets deep green, considerably wrinkled, otherwise identical with White Flageolet. A very early variety, therefore employed much for forcing.— Plate 41, f. 5.

Krumschnabel.§ Plant strictly dwarf, 12–15 in. high, with few leaves and branches. Leaflets yellowish green, 3–3½ in. long, 2¾–3 in. broad, slightly rough, but not wrinkled. Blossoms white. Pods green, 3–5 in. long, ⅜–⅝ in. broad, subterete, slightly curved, often bent and twisted, much swollen by the seed; spur slender, curved, ½ in. long.

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morin-And. Veg. Gard. 43. (1885). — *Haricot flageolet blanc.* Vilmorin-And. Pl. Pot. 250. (1883).
Phaseolus oblongus Laudunensis Martens, Gartenbohnen 54. (1860).

* *Dwarf White Long-pod.* Vilmorin-And. Veg. Gard. 43. (1885).

† *Buschbohne, Flageolet Wachs, mit weissen Bohnen.* Haage & Sch. Haupt-Verz. (1896).

‡ *Extra Early Dwarf Étampes.* Vilmorin-And. Veg. Gard. 44. (1885). — *Haricot flageolet très hâtif d'Étampes.* Vilmorin-And. Pl. Pot. 251. (1883).

§ Haage & Sch. Haupt-Verz. (1891).

Seed white, $\frac{3}{8}$—$\frac{9}{16}$ in. long, $\frac{1}{4}$—$\frac{5}{16}$ in. broad, varying considerably in size, subreniform.— Plate 41, f. 6.

†† Seed black.

LONG NEGRO.* Plant dwarf, 12–15 in. high, producing many short runners, branchy. Leaflets light green, 3–5 in. long, $2\frac{1}{2}$–$3\frac{1}{2}$ in. broad, scarcely wrinkled. Blossoms white with pinkish tinge. Pods green, often splashed with purple, 3–6 in. long, $\frac{3}{8}$–$\frac{1}{2}$ in. broad, straight or nearly so, subterete; spur curved, $\frac{1}{2}$ in. long. Seed black, $\frac{9}{16}$—$\frac{5}{8}$ in. long, $\frac{1}{4}$—$\frac{5}{16}$ in. broad, oblong, subreniform, rarely subtruncate. Medium early and productive.— Plate 41, f. 7.

LONG ALGERIAN.† Identical with the preceding except that the pods are yellow.

††† Neither black nor white.

KENTUCKY WONDER.‡ Plant climbing 4–6 ft., extremely vigorous. Leaflets dark green, $2\frac{1}{2}$–3 in. long, 2–$2\frac{3}{4}$ in. broad. Blossoms white. Pods green, 5–7 in. long, $\frac{7}{16}$—$\frac{1}{2}$ in. broad, subterete, usually bent and twisted. Seed dark brownish drab, darker around the hilum, $\frac{1}{2}$—$\frac{5}{8}$ in. long, $\frac{1}{4}$—$\frac{5}{16}$ in. broad, oblong, a little flattened, rarely subreniform.— Plate 41, f. 8.

CREAM.§ Plant strictly dwarf, 8–10 in. high, compact.

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* *Negro Long-pod.* Vilmorin-And. Veg. Gard. 47. (1885). — *Prolific Market.* Thorburn, Cat. (1895). — *Haricot flageolet noir.* Vilmorin-And. Pl. Pot. 253. (1883). — *Haricot Shah de Perse.* Vilmorin-And. Cat. (1891). — *Buschbohne, Neger langschotige.* Haage & Sch. Haupt-Verz. (1878).

† *Long-podded Dwarf Algerian Butter.* Vilmorin-And. Veg. Gard. 65. (1885). — *Haricot d'Alger noir nain à longue cosse.* Vilmorin-And. Pl. Pot. 273. (1883).

Philadelphia Commercial Museum, seeds, No. 10469, "Caraotas negras pintas" State of Miranda, Venezuela; 10913, Buenos Ayres, Argentina.

‡ [Wing], Rept. N. Y. Exp. Sta. **1**:110. (1882). — *Old Homestead.* Henderson, Cat. (1891).

§ *Henderson's Cream Valentine.* Henderson, Cat. (1897).
Philadelphia Commercial Museum, seeds, No. 10919, Polk Co., Ga.

Leaflets yellowish-green, 3–3½ in. long, 1¾–2 in. broad, thick, smooth. Pods green, 3–4 in. long, ⅜–½ in. broad, subterete, greatly curved; spur nearly straight, ½ in. long. Seed light yellowish brown, faintly darker around the hilum, 9/16–⅝ in. long, ¼–5/16 in. broad, ovate-oblong, usually with truncated ends, more or less dented and wrinkled. — Plate 41, f. 9.

Ne Plus Ultra.* Plant strictly dwarf, 10–12 in. high, compact. Leaflets bright green, 3–4 in. long, 2¼–3 in. broad, much wrinkled. Blossoms white tinged with purple. Pods light or grayish green, 3–5 in. long, ½–⅝ in. broad, ¼–⅜ in. thick, slightly curved; spur slender, slightly curved, ½ in. long. Seed dull to rich brownish yellow, with dark ring around the hilum, ½–⅝ in. long, ¼–5/16 in. broad, ovate-oblong. Originated in England about 1884. — Plate 41, f. 10.

Dun.† Plant strictly dwarf, 15–18 in. high, very bushy, vigorous. Leaflets yellowish green, 3½–4 in. long, 2½–3 in. broad, a little wrinkled. Blossoms purplish. Pods green, 4–5 in. long, ⅜–½ in. broad, subterete, straight or nearly so; spur stout, ½ in. long. Seed of a dark brown or dun color, black around the hilum, 7/16–⅝ in. long, ¼ in. broad, oblong, often compressed at the ends, often subreniform. — Plate 41, f. 11.

Long Yellow.‡ Identical with the preceding, except in color of the seeds, which are yellowish or brownish yellow. — Plate 41, f. 12.

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* [Wing], Rept. N. Y. Exp. Sta. **2**: 253. (1883). — Vilmorin-And. Veg. Gard. 68. (1885). — *Buschbohne, Erfurter markige Fleisch.* Haage & Sch. Haupt-Verz. (1899).

Philadelphia Commercial Museum, seeds, No. 5511, "Frijoles," Puriscal, Costa Rica; 10485, "Frijoles grandes amarillos," Amatitlan, Guatemala.

† *Early Dun Colored.* [Wing], Rept. N. Y. Exp. Sta. **1**: 110. (1882).

‡ *Long Yellow Six Weeks.* Burr, Field & Gard. Veg. 464. (1863). *Phaseolus oblongus vinosus* Martens, Gartenbohnen 51. (1860)

Philadelphia Commercial Museum, seeds, No. 10744, "Saito," Iwate Agric. Institute, Japan.

DATE.* Identical with the preceeding except that the pods are yellow.

WARDWELL.† Plant strictly dwarf, 10–12 in. high. Leaflets light green, 2½–3 in. long, about as broad, rough but not wrinkled, rather thin. Blossoms white. Pods bright yellow, 3–5 in. long, ½–⅝ in. broad, ¼–⅜ in. thick, slightly curved; spur stout, curved, ½ in. long. Seed dingy white, with various shades of brown on the ventral surface, 9/16–⅝ in. long, ¼–5/16 in. broad, oblong, usually rounded at ends, reniform. — Plate 41, f. 13.

** Seed variegated.

† Marked with white.

MATCHLESS.‡ Plant strictly dwarf, 12–15 in. high. Leaflets yellowish green, 3–4 in. long, 2½–3 in. broad, scarcely wrinkled. Blossoms white. Pods green, 4–6 in. long, ⅜–½ in. broad, subterete, straight or nearly so; spur slender, straight, ½ in. long. Seed white with black spots at each end of the hilum which occasionally run together, 7/16–½ in. long, 3/16–¼ in. thick, oblong, subreniform. Very productive.— Plate 41, f. 14.

†† Seed with no white markings.

BULGARIAN.§ Plant climbing 2–3 ft., with few runners. Leaflets bright green, 2–2½ in. long, 1¾–2¼ in. broad,

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* *New Date Wax.* Thorburn, Cat. (1886).— *Buschbohne, Wachs Dattel.* Haage & Sch. Haupt-Verz. (1880).

† *Wardwell Kidney Wax.* Thorburn, Cat. (1887).
Phaselous oblongus saponaceus Martens, Gartenbohnen 59. (1860).
Philadelphia Commercial Museum, seeds, No. 10602, Humpata, Mossámedes, W. Africa; 10860, "Porates de cuarenta," Buenos Ayres, Argentina.

‡ *Haricot Incomparable.* — Vilmorin-And. Cat. (1895).— *Dwarf Matchless.* Vilmorin-And. Seed.

§ *Haricot de Bulgarie sans parchemin.* Vilmorin-And. Cat. (1891).
Field Columbian Museum, seeds, No. 13232: Philadelphia Commercial Museum, seeds, No. 10900, Buenos Ayres, Argentina.

slightly wrinkled, quite thin. Blossoms purplish. Pods green, more or less blotched with purple, 4–5 in. long, $\frac{3}{8}$–$\frac{1}{2}$ in. broad, subterete, slightly curved; spur slender, curved, $\frac{1}{2}$ in. long. Seed mostly reddish brown or drab, striped and splashed with drab, $\frac{9}{16}$–$\frac{11}{16}$ in. long, $\frac{1}{4}$–$\frac{5}{16}$ in. broad, ovate-oblong, slightly kidney shaped.— Plate 41, f. 15.

MARVEL.* Plant strictly dwarf, 12–15 in. high. Leaflets bright green, $2\frac{1}{2}$–$3\frac{1}{2}$ in. long, 2–3 in. broad, thick and considerably wrinkled. Blossoms white, often tinged with pink. Pods green, usually finely splashed with purple, 3–$4\frac{1}{2}$ in. long, $\frac{3}{8}$–$\frac{1}{2}$ in. broad, subterete, curved; spur slender, curved, $\frac{1}{2}$ in. long. Seed dark brown splashed with yellowish brown, $\frac{7}{16}$–$\frac{1}{2}$ in. long, $\frac{3}{16}$–$\frac{1}{4}$ in. broad, oblong, kidney shaped.— Plate 41, f. 16.

NETTLE LEAVED BAGNOLET.† Plant strictly dwarf, 10–12 in. high, vigorous, branchy. Leaflets dark green, 3–$3\frac{1}{2}$ in. long, 2–$2\frac{1}{2}$ in. broad, uniformly wrinkled and curled throughout, giving a distinct appearance. Blossoms purplish. Pods green, 4–5 in. long, $\frac{3}{8}$–$\frac{5}{8}$ in. broad, $\frac{1}{4}$ in. thick, curved; spur slender, curved, $\frac{1}{2}$ in. long. Seed indentical with Mohawk, except in being more flattened and quite strongly reniform. A moderate bearer. — Plate 41, f. 17.

PRIDE OF LYON.‡ Plant strictly dwarf, 10–12 in. high. Leaflets $3\frac{1}{2}$–4 in. long, $2\frac{1}{2}$–3 in. broad, much wrinkled. Blossoms purplish. Pods green, 4–6 in. long, $\frac{1}{2}$–$\frac{5}{8}$ in. broad, nearly as thick, flat, slightly curved; spur straight

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* *Marvel of Paris.* — Thorburn, Cat. (1895).—*Haricot nain Merveille de Paris.* Vilmorin-And. Cat. (1894).

† Thorburn, Cat. (1894). — *Haricot Bagnolet à feuille d'Ortie.* Vilmorin-And. Cat. (1894).

‡ *Haricot Gloire de Lyon nain.* Vilmorin-And. Cat. (1888). — *Buschbohne, Calure.* Haage & Sch. Haupt-Verz. (1892).

Philadelphia Commercial Museum, seeds, No. 10623, "Caraotas negras rayadas marquesinas," State of Miranda, Venezuela; 10909, Buenos Ayres, Argentina.

or nearly so, stout, 1 in. long. Seed black, splashed and spotted with yellowish red, $\frac{9}{16}$–$\frac{5}{8}$ in. long, $\frac{1}{4}$ in. wide, oblong, slightly reniform, rounded at ends.—Plate 41, f. 18.

Black Speckled.* Plant strictly dwarf, 10–15 in. high, vigorous. Leaflets dark green, $3\frac{1}{2}$–$4\frac{1}{2}$ in. long, 3–4 in. broad, slightly wrinkled, thick. Blossoms lilac. Pods light green, often blotched with purple, 4–6 in. long, $\frac{3}{8}$–$\frac{5}{8}$ in. broad, $\frac{1}{8}$–$\frac{1}{4}$ in. thick, curved; spur nearly straight, stout, $\frac{1}{2}$–$\frac{3}{4}$ in. long. Seed black or dark brown, spotted and splashed with red, $\frac{1}{2}$–$\frac{11}{16}$ in. long, $\frac{1}{4}$–$\frac{5}{16}$ in. broad, oblong, usually rounded at ends. Most extensively grown around Paris.—Plate 41, f. 19.

Eagle.† Identical with the preceding, except that the seed is usually much compressed on the ends, and much more splashed with red.

Mohawk.‡ Plant strictly dwarf, 12–15 in. high, branchy. Leaflets light green, $2\frac{1}{2}$–3 in. long, about the same width, slightly wrinkled, rather thin, often blistered. Bossoms white, later becoming tinged with purple. Pods green, often splashed with brownish lines, 3–5 in. long, $\frac{3}{8}$–$\frac{5}{8}$ in. broad, $\frac{1}{8}$–$\frac{3}{8}$ in. thick, a little flattened, curved; spur slender, curved, $\frac{1}{2}$–$\frac{3}{4}$ in. long. Seed dark chocolate brown to black, with lighter shades of brown and splashings of drab, $\frac{9}{16}$–$\frac{11}{16}$ in. long, $\frac{5}{16}$–$\frac{3}{8}$ in. broad, $\frac{3}{16}$–$\frac{1}{4}$ in. thick, oblong, slightly flattened, often subreniform. A very old variety, hardy and quite productive.—Plate 41, f. 20.

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* [Wing], Rept. N. Y. Exp. Sta. 2:254. (1883).—Vilmorin-And. Veg. Gard. 48. (1885).—*Haricot Bagnolet.* Vilmorin-And. Pl. Pot. 255. (1883).—*Buschbohne, Zucker von Bagnolet.* Haage & Sch. Haupt-Verz. (1897).

Philadelphia Commercial Museum, seeds, No. 10947, "Judia de la Granja," Medina del Campo, Spain.

† *Buschbohne, Adler rothe bunte.* Haage & Sch. Haupt-Verz. (1878).

‡ *Early Mohawk.* Browne, Rept. U. S. Pat. Off. 336. (1854).—Burr, Field & Gard. Veg. 464. (1863).— *Veitch's Early Favourite.* Veitch, Cat. (1897).

Phaseolus oblongus purpureovariegatus Martens, Gartenbohnen 56. (1860).

ILSENBURGER.* Differs from Mohawk only in seed being more of a drab and finely spotted with yellow. — Plate 41, f. 21.

VALENTINE.† Plant strictly dwarf, 9–12 in. high, with few leaves and branches. Leaflets deep green, 3–4 in. long, 2–3 in. broad, smooth. Blossoms white. Pods green, 3–5 in. long, $\frac{3}{8}$–$\frac{1}{2}$ in. broad, subterete, curved; spur slender, curved, $\frac{1}{2}$ in. long. Seed splashed and spotted with dark and light red, and a dark ring around the hilum, $\frac{1}{2}$–$\frac{5}{8}$ in. long, $\frac{1}{4}$–$\frac{5}{16}$ in. broad, oblong, subcylindrical, truncated at ends, often irregularly dented. Moderately early and productive. A justly popular sort.—Plate 41, f. 22.

LONGFELLOW.‡ An improved Valentine, the plant more vigorous, and pods a little longer, nearly straight, and very thick.

WILLIAMS.§ Plant identical with Valentine. Pods much flattened, blotched with purple. Seed $\frac{1}{2}$–$\frac{5}{8}$ in. long, $\frac{5}{16}$–$\frac{3}{8}$ in. broad, $\frac{3}{16}$–$\frac{1}{4}$ in. thick, not truncated at ends. Earlier than Valentine.—Plate 41, f. 23.

RED SPECKLED.‖ Identical with Sion House, except that the seeds are somewhat larger and more tumid, and more than twice as long as broad.

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* *Buschbohne, Ilsenburger bunte.* Haage & Sch. Haupt-Verz. (1878).

† *Early Valentine.* Browne, Rept. U. S. Pat. Off. 337. (1854). — Burr, Field & Gard. Veg. 462. (1863). — *Red Speckled Valentine.* Landreth, Cat. (1890). — *Round Red Valentine.* Livingstone, Cat. (1893). — *Buschbohne, Valentine.* Haage & Sch. Haupt-Verz. (1876).

Philadelphia Commercial Museum, seeds, No. 10625, "Caraotas ponchas," Venezuela; 10745, "Saito," Iwate Agric. Institute, Japan; 10824, "Feijão gurutuba vermelho," Parahyba, Brazil.

‡ Henderson, Cat. (1896). — *Buschbohne, Empereur de Russie.* Haage & Sch. Haupt-Verz. (1897).

§ *Buschbohne, Williams' Early Prolific.* Haage & Sch. Haupt-Verz. (1891).

‖ *Dwarf Red Speckled.* Vilmorin-And. Veg. Gard. 49. (1883). — *Haricot suisse rouge.* Vilmorin-And. Pl. Pot. 256. (1883). — *Goddard* or *Boston Favorite.* Burpee, Cat. (1894).

BLOOD SPECKLED.* Identical with preceding, except that the ground color is a dark blood red with lighter red splashings. — Plate 41, f. 24.

VALENTINE WAX.† Identical with Valentine, except in pods, which are bright yellow.

aaaaa. **Seeds decidedly flattened.**

* **Less than twice as long as broad.**

† One color.

‡ White.

JULY.‡ Plant climbing 3–4 ft., vigorous. Leaflets deep green, $2\frac{1}{4}$–$2\frac{3}{4}$ in. long, 2–$2\frac{1}{2}$ in. wide, thin, quite smooth. Blossoms white. Pods green, $2\frac{1}{2}$–$4\frac{1}{2}$ in. long, $\frac{1}{4}$–$\frac{3}{8}$ in. broad, subterete, straight or nearly so; spur slender, curved, $\frac{1}{4}$ in. long. Seed white or yellowish white, $\frac{3}{8}$–$\frac{1}{2}$ in. long, $\frac{1}{4}$–$\frac{5}{8}$ in. broad, oblong-elliptical, sometimes slightly subreniform, truncated at ends. Very productive. — Plate 42, f. 1.

AUGUSTA.§ Plant strictly dwarf, 8–10 in. high, with few branches. Leaflets dark green, $4\frac{1}{2}$–5 in. long, $3\frac{1}{2}$–4 in. wide, rough, thick. Blossoms white, pods yellow, 4–$5\frac{1}{2}$ in. long, $\frac{1}{2}$–$\frac{9}{16}$ in. broad, much flattened, greatly curved; spur straight, stout, $\frac{1}{4}$ in. long. Seed dingy white, $\frac{1}{2}$–$\frac{5}{8}$ in. long, $\frac{1}{4}$–$\frac{3}{8}$ in. broad, $\frac{1}{4}$ in. thick, flattened, subreniform, truncated at ends. — Plate 42, f. 2.

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* *Dwarf Blood Speckled.* Vilmorin-And. Veg. Gard. 49. (1885). — *Haricot sang de boeuf.* Vilmorin-And. Pl. Pot. 256. (1883).

† *Thorburn Valentine Wax.* Thorburn, Cat. (1895).

‡ *Stangenbohne Juli.* Haage & Sch. Haupt-Verz. (1899).
Philadelphia Commercial Museum, seeds, No. 10875, "Porates cordobes," State of Santa Fé, Argentina; 10886, Santa Fé, Argentina.

§ *Buschbohne, Kaiserin Augusta.* Haage & Sch. Haupt-Verz. (1890).
Field Columbian Museum, seeds, No. 1788: Philadelphia Commercial Museum, seeds, No. 10556, Montevideo, Uruguay; 10557, "Porates Sabres ranas," Buenos Ayres; 10779, Varna, Bulgaria; 10780, Tirnovo, Bulgaria; 10871; "Porates Soisson blancos," Buenos Ayres, Argentina.

PRINCESS BISMARCK.* Plant climbing, 2–3 ft. high, moderately vigorous, with few runners. Leaflets deep green, $2\frac{1}{4}$–$2\frac{3}{4}$ in. long, $1\frac{3}{4}$–$2\frac{1}{4}$ in. broad, much wrinkled, thick. Blossoms white. Pods green, $3\frac{1}{2}$–$4\frac{1}{2}$ in. long, $\frac{1}{2}$–$\frac{9}{16}$ in. wide, $\frac{1}{4}$ in. thick, a little flattened, slightly curved; spur straight, slender, $\frac{1}{4}$ in. long. Seed white, $\frac{1}{2}$–$\frac{5}{8}$ in. long, $\frac{1}{4}$–$\frac{3}{8}$ in. broad, $\frac{1}{8}$–$\frac{3}{16}$ in. thick, oblong, elliptical, subreniform, usually truncated at ends. A very prolific sort. — Plate 42, f. 3.

GOLDEN CLUSTER.† Plant climbing 5–6 ft., extremely vigorous. Leaflets bright green, 3–$3\frac{1}{2}$ in. long, $2\frac{1}{2}$–3 in. broad, somewhat wrinkled. Blossoms white. Pods yellow, 5–8 in. long, $\frac{1}{2}$–$\frac{5}{8}$ in. broad, quite flat, curved. Seed dingy white, $\frac{1}{2}$–$\frac{5}{8}$ in. long, $\frac{5}{16}$–$\frac{3}{8}$ in. broad, $\frac{3}{16}$–$\frac{1}{4}$ in. thick, subreniform, slightly bulged. Rather late, but one of the most productive sorts. — Plate 42, f. 4.

CASE KNIFE.‡ Plant climbing 2–$3\frac{1}{2}$ ft., vigorous, with many runners. Leaflets light green, $2\frac{1}{4}$–$2\frac{3}{4}$ in. long, about as broad, rather thin and papery, considerably curved and wrinkled. Blossoms white. Pods light green, $4\frac{1}{2}$–$6\frac{1}{2}$ in. long, $\frac{1}{2}$–$\frac{3}{4}$ in. broad, $\frac{1}{4}$–$\frac{3}{8}$ in. thick, with strong tendency to bend sidewise but not to curve edgewise, usually very irregular in shape owing to the abortion of some seeds; spur slender, curved, $\frac{1}{2}$ in. long. Seed white, $\frac{1}{2}$–$\frac{5}{8}$ in. long, $\frac{1}{4}$–$\frac{3}{8}$ in. broad, $\frac{1}{8}$–$\frac{1}{4}$ in. thick, reniform, slightly wrinkled, usually rounded at ends. — Plate 42, f. 5.

WAX CASE KNIFE.§ Identical with the preceding, except that the pods are of a waxy yellow. — Plate 42, f. 6.

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* *Buschbohne, Fürstin Bismarck.* Haage & Sch. Haupt-Verz. (1890).

† Greiner, How to Make Gard. Pay 153. (1890).

Philadelphia Commercial Museum, seeds, No. 10558, Pazardjik, Bulgaria; 10775, Tirnova, Bulgaria.

‡ *Stangenbohne, Riesen-Zucker-Brech; Zucker-Brech-früheste; Schwert weisse.* Haage & Sch. Haupt-Verz. (1870).

§ *Stangenbohne, Wachsschwert; Korbfüller-Wachs.* Haage & Sch. Haupt-Verz. (1899).

INEXHAUSTIBLE.* Plant strictly dwarf, 8–10 in. high, with tendency to produce flowering stalks above the leaves. Leaflets yellowish green, $2\frac{1}{2}$–$2\frac{3}{4}$ in. long, 2–$2\frac{1}{4}$ in broad, quite rough and thick. Blossoms white, mostly borne in spikes above the leaves. Pods green, 3–4 in. long, $\frac{3}{8}$–$\frac{1}{2}$ in. broad, slightly curved; spur slender, curved, $\frac{1}{2}$ in. long. Seed white, slightly flattened, reniform. Late but very productive. — Plate 42, f. 7.

DWARF CASE KNIFE.† Plant strictly dwarf, 8–10 in. high, branchy, spreading. Leaflets yellowish-green, $2\frac{1}{2}$–$3\frac{1}{2}$ in. long, $1\frac{3}{4}$–2 in. broad, considerably wrinkled. Blossoms white. Pods green, $4\frac{1}{2}$–$5\frac{1}{2}$ in. long, $\frac{1}{2}$–$\frac{3}{4}$ in. broad, $\frac{1}{4}$–$\frac{5}{8}$ in. thick, slightly curved; spur stout, curved, $\frac{1}{4}$–$\frac{3}{8}$ in. long. Seed dingy white, $\frac{1}{2}$–$\frac{5}{8}$ in. long, $\frac{1}{4}$–$\frac{3}{8}$ in. broad, $\frac{1}{8}$–$\frac{1}{4}$ in. thick, oblong, subcylindrical, sometimes with truncated ends. Very productive and excellent for forcing. — Plate 42, f. 8.

UNIQUE.‡ Plant strictly dwarf, 12–15 in. high, vigorous. Leaflets deep green, $2\frac{1}{2}$–3 in. long, nearly as broad, quite thick, considerably wrinkled. Blossoms white. Pods green, 4–6 in. long, $\frac{1}{2}$ in. broad, flattened, more or less curved. Seed white, $\frac{1}{2}$–$\frac{5}{8}$ in. long, $\frac{1}{4}$–$\frac{3}{8}$ in. broad, $\frac{1}{8}$–$\frac{1}{4}$ in. thick, reniform, usually with rounded ends. — Plate 42, f. 9.

SOISSONS.§ Plant climbing $4\frac{1}{2}$–6 ft., moderately vigorous,

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* *Haricot l'Inépuisable nain.* Vilmorin-And. Cat. (1897).

† *Dwarf Early White Scimitar.* Vilmorin-And. Veg. Gard. 51. (1885). — *Emperor William.* Thorburn, Cat. (1884). — *Dwarf Rhode Island Case Knife.* Henderson, Cat. (1891). — *Haricot sabre nain hâtif de Hollande.* Vilmorin-And. Pl. Pot. 258. (1883).

‡ Vilmorin-And. Veg. Gard. 66. (1885). — *Haricot nain blanc Unique.* Vilmorin-And. Pl. Pot. 275. (1883).

§ Burr, Field & Gard. Veg. 491. (1863). — *Soissons Large Runner.* Vilmorin-And. Veg. Gard. 39. (1885). — *Haricot de Soissons à rames.* Vilmorin-And. Pl. Pot. 246. (1883). — *Haricot de Soissons blanc.* [Wing], Rept. N. Y. Exp. Sta. **2**: 249. (1883). — *Large White Laincourt.* Vilmorin-And. Veg. Gard. 40. (1885). — *Haricot de Laincourt.* Vilmorin-And. Pl. Pot. 247. (1883).

Phaseolus compressus candidus Martens, Gartenbohnen 51. (1860).

Philadelphia Commercial Museum, seeds, No. 10553, Japan.

with few leaves and slender stem. Leaflets 3–3½ in. long, 2½–3 in. broad, inclined to diamond shape, slightly wrinkled, quite thin and papery. Blossoms white. Pods green, 4–6 in. long, ½–¾ in. broad, ¼ in. thick, much flattened, slightly curved, often bent sidewise; spúr slender, curved, ½–¾ in. long. Seed an ivory white, ⅝–⅞ in. long, 5/16–7/16 in. broad, ⅛–¼ in. thick, strongly reniform, quite irregular in shape, occasionally a little wrinkled.—Plate 42, f. 10.

Dwarf Soissons.* Plant strictly dwarf, 10–12 in. high, spreading, branchy. Leaflets deep green, 3–3½ in. long, 2¼–2¾ in. broad, considerably wrinkled. Blossoms white. Pods green, 3–4½ in. long, ½–⅝ in. broad, ¼–⅜ in. thick, slightly curved. Seeds snow white, ½–⅝ in. long, ¼–⅜ in. wide, flattened, subreniform. Resembles Soissons, but is a little smaller. Very productive.—Plate 42, f. 11.

Green Soissons.† Identical with the preceding, except that the seeds are dingy white with a trace of green, flattened, reniform.—Plate 42, f. 12

‡‡ Seeds black.

Smyth's Hybrid.‡ Plant strictly dwarf, 6–8 in. high, compact. Leaflets small. Blossoms pink. Pods green, later becoming faintly blotched with purple, 3–4 in. long, ⅜–½ in. broad, ⅛ in. thick; spur stout, ½ in. long. Seed black or brownish black, 7/16–9/16 in. long, ¼–5/16 in. broad, 3/16–¼ in. thick, subreniform, often with truncated ends.—Plate 42, f. 13.

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* Vilmorin-And. Veg. Gard. 51. (1885). — *Haricot de Soissons nain.* Vilmorin-And. Pl. Pot. 258. (1883).

Phaseolus compressus humilis Martens, Gartenbohnen 42. (1860).

† *Haricot de Soissons nain vert.* Vilmorin-And. Cat. (1898).

‡ Veitch, Cat. (1897).

Philadelphia Commercial Museum, seeds, No. 5058, "Frijoles negros," San Martin, San Salvador, Salvador; 5059, "Frijoles negrotos," San Martin, Dept. San Salvador, Salvador; 5066, "Frijoles negros," San Martin, Dept. San Salvador, Salvador; 10507, São Lourenço, Brazil; 10649, State of Mexico, Mexico.

TURTLE SOUP.* Plant climbing 3–4 ft., moderately branched, rather stout and compact. Leaflets light green, 3–3½ in. long, 2–2½ in. broad, slightly wrinkled, a little rough, thin. Flowers purple. Pods light green, afterwards becoming blotched with purple, 3½–4½ in. long, ⅜–½ in. wide, ¼ in. thick, strongly curved; spur slender, slightly curved, ¼–½ in. wide, a little flattened, often with truncated ends. A very old variety, having been mentioned in England in the early part of the last century. Not very generally grown at the present time. — Plate 42, f. 14.

BLACK SIMITAR.† Plant climbing 4–5 ft., with stout stem. Leaflets pale green, 3–4 in. long, 2–3 in. broad, considerably wrinkled. Blossoms purplish. Pods green with splashings of violet, 5–7 in. long, ⅝–¾ in. broad, in-

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* Burr, Field & Gard. Veg. 475. (1863.) — [Wing], Rept. N. Y. Exp. Sta. **1**: 100. (1882).

Phaseolus vulgaris nigerrimus Zuccagni, Martens, Gartenbohnen 26. (1860).

Field Columbian Museum, seeds, No. 15959; 16523: Philadelphia Commercial Museum, seeds, No. 5070, "Frijoles negros," Puriscal, Costa Rica; 5071, "Frijoles," Escasu, Costa Rica; 5073, "Frijoles negros," Aserri, Costa Rica; 5076, "Frijoles," Puriscal, Costa Rica; 5085, "Frijoles negros del Brazil," Escasu, Costa Rica; 5086, "Frijoles negros," Santa Ana, Escasu, Costa Rica; 5093, "Frijoles negros," Puriscal, Costa Rica; 5100, "Frijoles negros," Puriscal, Costa Rica; 5502, "Frijoles negros," Santiago, Puriscal, Costa Rica; 5508, "Frijoles negros," Puriscal, Costa Rica; 5512, "Frijoles negros," Ficafres, Puriscal, Costa Rica; 10501, Tenango, State of Mexico, Mexico; 10503, "Frijol negro," Sacatepéquez, Guatemala; 10505, "Caraotas negras," State of Miranda, Venezuela; 10630, "Caraotas negras," District of Zamon, State of Carabobo, Venezuela; 10631, "Caraotas negras," Valencia, State of Carabobo, Venezuela; 10650, Kochinilco, Federal District, Mexico; 10651, Metztitlan, State of Hidalgo, Mexico; 10652, Tampico, Mexico; 10798, Angola, West Africa; 10813, "Feijão preto," Parahyba, Brazil.

† *Edible Podded Black Scimitar.* Vilmorin-And. Veg. Gard. 60. (1885). — *Haricot sabre noir sans parchemin.* Vilmorin-And. Pl. Pot. 268. (1883).

Phaseolus compressus niger Martens, Gartenbohnen 39. (1860).

Philadelphia Commercial Museum, seeds, No. 10657, "Frijol Ayacote," Mexico; 10912, Buenos Ayres, Argentina.

clined to bend sidewise, but not curved edgewise; spur straight, ½ in. long. Seed black, ⅝–¾ in. long, ⅜–½ in. broad, reniform, a little tumid. — Plate 42, f. 15.

White Zulu.* A subvariety of the preceding, with whitish pods usually splashed a little with violet. Introduced 1888. — Plate 42, f. 16.

‡‡‡ Seed neither white nor black.

= Less than ½ in. long.

Chartres.† Plant climbing 2–3 ft., with many branches and runners. Leaflets yellowish green, 2–2½ in. long, 1¾–2 in. broad, slightly wrinkled. Blossoms white. Pods green, 3½–4½ in. long, ⅜–⅝ in. broad, ¼ in. thick, curved; spur slender, straight, ¼–½ in. long. Seed a deep wine red color, 7/16–9/16 in. long, ¼–⅜ in. broad, ⅛–¼ in. thick, with truncated ends. Grown extensively as a field crop in France. — Plate 42, f. 17.

Emperor.‡ Plant climbing 3–4 ft., with numerous slender runners. Blossoms white, blotched with pink. Leaflets bright green, 2½–3 in. long, about as broad, thin, a little wrinkled. Pods green, 3–4½ in. long, ⅜–½ in. broad, considerably flattened, curved; spur slender, curved, ½ in. long. Seed dullish brown, 7/16–½ in. long, ¼–5/16 in. broad, ⅜ in. thick, oblong, elliptical, tapering somewhat to wedge-shape. — Plate 42, f. 18.

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* Burpee, Cat. (1888).

† *Chartres Red.* Vilmorin-And. Veg. Gard. 42. (1885). — *Haricot rouge de Chartres.* Vilmorin-And. Pl. Pot. 249. (1883).

Field Columbian Museum, seeds, No. 15955, 16509: Philadelphia Commercial Museum, seeds, No. 5866, "Frijoles," Dept. Cortez, Honduras; 6208, "Frijoles colorados," Dept. Leon, Nicaragua; 10489, "Frijoles ocres grandes," Santo Domingo, Costa Rica; 10492, Russia; 10672, Hochinilco, Federal District, Mexico; 10682, Morelia, State of Michoacan, Mexico; 10698, "Para leño limoncillo," Querétaro, Mexico; 10710, "Frijol amarillo," Federal District, Mexico.

‡ *Stangenbohne, Kaiser Friedrich.* Haage & Sch. Haupt-Verz. (1890).

WILLMOT.* Plant dwarf, 10–12 in. high, often producing runners 6–12 in. long. Leaflets deep green, $2\frac{1}{2}$–$2\frac{3}{4}$ in. long, $2\frac{1}{4}$–$2\frac{1}{2}$ in. broad, thin, papery. Blossoms purplish. Pods green, 3–5 in. long, $\frac{3}{8}$–$\frac{1}{2}$ in. broad, slightly curved; spur stout, nearly straight, $\frac{1}{4}$ in. long. Seed yellowish brown, with dark ring around the hilum, $\frac{5}{16}$–$\frac{3}{8}$ in. long, $\frac{1}{4}$ in. broad, $\frac{3}{16}$ in. thick, compressed, usually truncated. — Plate 42, f. 19.

== Seeds more than $\frac{1}{2}$ in. long.

JAPAN.† Plant climbing 4–5 ft., with few runners. Leaflets light green, about same breadth as length, $2\frac{1}{2}$–3 in., wrinkled, quite thick. Blossoms purplish. Pods green, 4–6 in. long, $\frac{1}{2}$–$\frac{5}{8}$ in. broad, flat, greatly curved; spur slender, curved, $\frac{1}{2}$ in. long. Seed coffee-brown, $\frac{5}{8}$–$\frac{3}{4}$ in. long, $\frac{3}{8}$–$\frac{7}{16}$ in. broad, bulged, reniform. Quite productive. — Plate 42, f. 20.

RED SOISSONS.‡ Plant climbing 5–6 ft., with few runners. Leaflets $2\frac{1}{2}$–3 in. long, 2–$2\frac{1}{2}$ in. broad. Pods yellow, 5–7 in. long, $\frac{1}{2}$–$\frac{5}{8}$ in. broad, straight or nearly so, flat; spur stout, nearly straight. Seed bright reddish brown, $\frac{1}{2}$–$\frac{5}{8}$ in.

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* *Buschbohne, Willmot's Zwerg.* Haage & Sch. Haupt-Verz. (1878). *Phaseolus ellipticus Willmotianus* Martens, Gartenbohnen 64. (1860).

Field Columbian Museum, seeds, No. 16516: Philadelphia Commercial Museum, seeds, No. 10823, Espiritu Santo, Brazil; 10829, "Feijão gurutuba," Parahyba, Brazil.

† *Giant Japan Butter.* Vilmorin-And. Veg. Gard. 61. (1885).— *Haricot beurre géant du Japon.* Vilmorin-And. Pl. Pot. 269. (1883).

‡ Vilmorin-And. Veg. Gard. 42. (1885). — *Burpee's Sunshine.* Burpee, Cat. (1893). — *Haricot de Soissons rouge.* Vilmorin-And. Pl. Pot. 249. (1883).

Field Columbian Museum, seeds, No. 431; 12019; 16510; 16518: Philadelphia Commercial Museum, seeds, No. 10646, "Frijol prieto," Cordoba, Vera Cruz, Mexico; 10686, State of Guerrero, Mexico; 10688, State of Mexico, Mexico; 10704, Tenancingo, State of Mexico, Mexico; 10705, "Frijol bayo," Puebla, Mexico; 10711, Metztitlan, State of Mexico, Mexico; 10712, "Ayacote," Tenancingo, State of Mexico, Mexico; 10961, Salamá, Baja Verapaz, Guatemala; 10988, Sacatepéquez, Guatemala.

long, $\frac{5}{16}$–$\frac{3}{8}$ in. broad, $\frac{1}{4}$ in. thick, with rounded ends.—Plate 42, f. 20.

Purple Pod.* Plant climbing 4–5 ft., extremely vigorous, with stout purple stems and leaf stalks. Leaflets purplish green, $2\frac{1}{2}$–3 in. long, $2\frac{1}{2}$–$2\frac{3}{4}$ in. broad, much wrinkled, thin, few. Blossoms purple. Pods purple, 3–5 in. long, $\frac{3}{8}$–$\frac{5}{8}$ in. broad, subterete, more or less curved, torulose. Seed in various shades of yellowish green with dark ring around the hilum, $\frac{3}{8}$–$\frac{9}{16}$ in. long, $\frac{3}{16}$–$\frac{5}{16}$ in. broad, $\frac{3}{16}$–$\frac{1}{4}$ in. thick, irregularly flattened, often with truncated ends, slightly kidney shaped. A very old and productive French variety not in cultivation in America.—Plate 42, f. 22.

Dwarf Purple Pod.† Identical with the preceding, except that the plant is strictly dwarf, 8–10 in. high. Of German origin, introduced into America in 1888.

Superb.‡ Plant dwarf, 8–10 in. high. Leaflets yellowish green, 2–$2\frac{1}{2}$ in. long, $1\frac{1}{2}$–2 in. broad, slightly wrinkled, thin and papery. Blossoms light pink. Pods green, 3–5 in. long, $\frac{3}{8}$–$\frac{1}{2}$ in. broad, subterete; spur slender, nearly straight, $\frac{1}{2}$ in. long. Seed bright yellowish brown, splashed with fine flecks of a lighter shade, $\frac{1}{2}$–$\frac{5}{8}$ in. long, $\frac{1}{4}$–$\frac{3}{8}$ in. broad, $\frac{3}{16}$–$\frac{1}{4}$ in. thick, reniform. Very productive.—Plate 42, f. 23.

Thüringen.§ Plant climbing 3–4 feet, with few slender

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* *Purple-podded.* Vilmorin-And. Veg. Gard. 60. (1885).—*Haricot à cosse violette.* Vilmorin-And. Pl. Pot. 268. (1883).—*Stangenbohnen, Speck violette schotige.* Haage & Sch. Haupt-Verz. (1878).

Field Columbian Museum, seeds, No. 11391: Philadelphia Commercial Museum, seeds, No. 5094, "Frijoles rosados," Puriscal, Costa Rica; 10618, "Frijoles bayos medianos," Santa Ana, Costa Rica.

† Burpee, Cat. (1894).

‡ *Superb Early Forcing.* Veitch, Cat. (1897).—*Haricot jaune trés hâtif de Chalandray.* Vilmorin-And. Cat. (1891).

Philadelphia Commercial Museum, seeds, No. 10692, Tenancingo, State of Mexico, Mexico.

§ *Stangenbohne, Ruhm von Thüringen.* Haage & Sch. Haupt-Verz. (1895).

Philadelphia Commercial Museum, seeds, No. 10685, Tenancingo, State of Mexico, Mexico; 10694, Tenancingo, State of Mexico, Mexico.

runners. Leaflets light green, $2\frac{1}{2}$–3 in. long, 2–$2\frac{1}{2}$ in. broad, quite thin, much wrinkled. Blossoms white, tinged with pink. Pods a light or yellowish green, 4–5 in. long, $\frac{1}{2}$–$\frac{5}{8}$ in. broad, $\frac{1}{4}$–$\frac{3}{8}$ in. thick, flat; spur stout, curved, $\frac{1}{2}$ in. long. Seed yellowish brown, $\frac{9}{16}$–$\frac{5}{8}$ in. long, $\frac{5}{16}$–$\frac{3}{8}$ in. broad, $\frac{3}{16}$ in. thick, subreniform, usually bulged sideways.— Plate 42, f. 24.

†† Seed variegated.

Forty Days.* Plant dwarf, 8–12 in. high, bushy, producing many short runners. Leaflets variable, 3–5 in. long, 2–4 in. broad, lower much larger than the upper ones. Blossoms purple. Pods green, $3\frac{1}{2}$–$4\frac{1}{2}$ in. long, $\frac{3}{8}$ in. broad, flat, straight or nearly so. Seed red or yellowish brown striped with black, $\frac{3}{8}$–$\frac{1}{2}$ in. long, $\frac{1}{4}$–$\frac{5}{16}$ in. broad, $\frac{3}{16}$ in. thick, flattened, rounded or rarely with truncated ends. Late, moderately productive.— Plate 43, f. 1.

Fejee.† Plant dwarf, 10–12 in. high, with numerous runners 2 ft. long, making a very bushy plant. Leaflets light green, $2\frac{1}{2}$–$2\frac{3}{4}$ in. long, 2–$2\frac{1}{2}$ in. wide, scarcely wrinkled. Blossoms white tinged with purple. Pods green often blotched with purple, 3–5 in. long, $\frac{3}{8}$–$\frac{5}{8}$ in. broad, $\frac{3}{16}$–$\frac{1}{4}$ in. thick, very flat, usually slightly curved. Seed varying in color from grayish white to mixed drab, slate and brown, $\frac{3}{8}$–$\frac{9}{16}$ in. long, nearly as broad, $\frac{3}{16}$–$\frac{1}{4}$ in. thick. Early and moderately productive.— Plate 43, f. 2.

Reine.‡ Plant climbing 3–5 ft., extremely vigorous.

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* *Buschbohne, vierzigtägige.* Haage & Sch. Haupt-Verz. (1876).
Field Columbian Museum, seeds, No. 16520: Philadelphia Commercial Museum, seeds, No. 5072, "Frijoles de Las Pavus," San José, Costa Rica; 5547, "Frijoles," Puriscal, Costa Rica; 10483, "Frijoles gris negros," San José, Escasu, Costa Rica; 10613, "Frijoles coquillos octeados," San Antonio Belen, Costa Rica; 10664, Tenancingo, State of Mexico, Mexico; 10677, Federal District, Mexico; 10699, Mexico; 10707, Tenancingo, State of Mexico, Mexico.

† *Early Fejee.* [Wing], Rept. N. Y. Exp. Sta. **1**: 109. (1882).
Field Columbian Museum, seeds, No. 13229.

‡ *Stangenbohne, Reine de France.* Haage & Sch. Haupt-Verz. (1891).
Field Columbian Museum, seeds, No. 12018.

Leaflets 3–3½ in. long, 2½–3 in. broad, thin, much wrinkled. Blossoms purplish. Pods light green, 6–8 in. long, ⅝–¾ in. broad, greatly curved; spur slightly curved, ½ in. long. Seed light yellowish green with few black stripes, some extending the entire length, 11/16–⅞ in. long, ⅜–7/16 in. broad, very flat and bulged.— Plate 43, f. 3.

MARBLED SWORD.* Plant bushy, producing many short runners. Leaflets bright green, 3–3½ in. long, about as broad, considerably wrinkled, quite thin. Blossoms purplish. Pods green, usually blotched with purple, 3–4 in. long, ⅜–½ in. broad, flat, slightly curved; spur stout, curved, ⅜ in. long. Seed light red, striped with black, ⅜–½ in. long, 5/16–⅜ in. broad, ⅛–¼ in. thick, irregular in shape, oblong-ovate to flat and subreniform, usually with truncated ends. Moderately productive.— Plate 43, f. 4.

** Seed more than twice as long as broad.

† One color.

‡ White.

NETTLE LEAVED CANTERBURY.† Plant strictly dwarf, 6–8 in. high. Leaflets dark green, 2¼–2¾ in. long, 1¾–2¼ in. broad, deeply and uniformly wrinkled throughout the entire surface. Blossoms white. Pods green, 3–5 in. long, ⅜–½ in. broad, ¼ in. thick, greatly curved; spur slender, curved, ½ in. long. Seed snow white, ½–⅝ in. long, ¼–⅜ in. broad, oblong, elliptical, often subreniform.— Plate 43, f. 5.

WONDER.‡ Plant strictly dwarf, branchy, 10–15 in.

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* *Buschbohne, buntkörnige Schwert.* Haage & Sch. Haupt-Verz. (1895).

† Vilmorin-And. Veg. Gard. 45. (1885).— *Haricot flageolet à feuille gaufrée.* Vilmorin-And. Pl. Pot. 252. (1883).— *Buschbohne, Nieren weisse nesselblättrige.* Haage & Sch. Haupt-Verz. (1876).

‡ *Wonder of France.* Vilmorin-And. Veg. Gard. 46. (1885).— *Haricot flageolet, Merveille de France.* Vilmorin-And. Cat. (1891).— *King of the Greens, Flageolet Long Green.* Vilmorin-And. Seed.

Philadelphia Commercial Museum, seeds, No. 10877, Buenos Ayres, Argentina.

high. Leaflets deep green, $3\frac{1}{4}$–$3\frac{3}{4}$ in. long, $2\frac{3}{4}$–$3\frac{1}{4}$ in. broad, quite thick, rough but not wrinkled. Blossoms white, pods green, 4–6 in. long, $\frac{3}{8}$–$\frac{5}{8}$ in. broad, $\frac{1}{4}$ in. thick, slightly curved; spur slender, curved, $\frac{1}{2}$ in. long. Seed identical with Nettle Leaved Canterbury, except that it usually has a slight trace of green color.

BAGNOLET VERT.* Identical with preceding except that the plant has a distinctly less branchy habit, and pods are a little shorter.

WHITE LYONNAISE.† Plant strictly dwarf, 12–15 in. high. Leaflets light green, $3\frac{1}{2}$–4 in. long, 3–$3\frac{1}{2}$ in. broad, thick, quite rough. Blossoms white, slightly tinged with pink. Pods green, 4–5 in. long, $\frac{3}{8}$–$\frac{1}{2}$ in. broad, subterete, more or less curved; spur stout, curved, $\frac{1}{2}$–$\frac{5}{8}$ in. long. Seed yellowish white, $\frac{3}{8}$–$\frac{1}{2}$ in. long, $\frac{1}{4}$ in. broad, nearly as thick, apparently flattened because of the permanent ridge along the dorsal part.— Plate 43, f. 6.

TRIUMPH.‡ Plant strictly dwarf, 8–10 in. high, very compact. Leaflets bright green, 2–$2\frac{3}{4}$ in. long, $1\frac{1}{2}$–2 in. broad, thin, smooth. Blossoms white. Pods green, $2\frac{1}{2}$–3 in. long, $\frac{3}{8}$–$\frac{7}{16}$ in. broad, subterete, curved; spur slender, nearly straight, $\frac{3}{8}$ in. long. Seed white, $\frac{3}{8}$–$\frac{1}{2}$ in. long, $\frac{3}{16}$–$\frac{1}{4}$ in. broad, $\frac{1}{8}$ in. thick, reniform. Very early and productive. One of the best forcing kinds.— Plate 43, f. 7.

‡‡ Seed black.

AMERICAN WAX.§ Plant climbing 4–5 ft., moderately vigorous, with few runners. Leaflets light green, $2\frac{1}{2}$–3 in.

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* *Haricot Bagnolet vert.* Vilmorin-And. Cat. (1891). — *Buschbohne, roi des verts.* Haage & Sch. Haupt-Verz. (1893).

† *Haricot nain Lyonnais à grain blanc.* Vilmorin-And. Cat. (1895).

‡ *Triumph of the Frames.* Thorburn, Cat. (1894). — *Haricot flageolet nain Triomphe des châssis.* Vilmorin-And. Cat. (1895).

§ *Stangenbohne, Wachs amerikanische.* Haage & Sch. Haupt-Verz. (1897).

Field Columbian Museum, seeds, No. 16524.

long, 2–2¼ in. broad, quite thick, considerably wrinkled. Blossoms purplish. Pods greenish yellow, 4–6 in. long, ½–⅝ in. broad, flat, greatly curved; spur slender, curved, ¾ in. long. Seed black or very dark brown, 11/16–¾ in. long, 5/16–⅜ in. broad, 3/16 in. thick, reniform, bulged. Very productive.—Plate 43, f. 8.

Golden Champion.* Plant climbing 2–3 ft., with few runners. Leaflets light green, 2–2½ in. long, about as broad, thin, considerably wrinkled. Blossoms white with pinkish tinge. Pods yellow, 2–4 in. long, ⅜–½ in. broad, ¼ in. thick, greatly curved, often twisted; spur slender, straight, ¼ in. long. Seed reddish to blackish brown, ½–⅝ in. long, ¼–5/16 in. broad, ⅛–3/16 in. thick, usually reniform.—Plate 43, f. 9.

‡‡‡ Seed neither white nor black.

Lyonnaise.† Plant dwarf, 12–15 in. high, branchy. Leaflets light or yellowish green, 2½–3 in. long, 2–2½ in. broad, slightly wrinkled. Blossoms white. Pods green, 5–6 in. long, ⅜ in. thick, terete, greatly curved; spur slender, ½ in. long. Seed yellowish to reddish brown with darker area around the hilum, ½–¾ in. long, ¼–⅜ in. broad, 3/16–¼ in. thick, often subreniform, usually with truncated ends and irregularly twisted and dented with the hilum a little to one side, and a permanent ridge along the dorsal edge. Medium early and very productive.—Plate 43, f. 10.

Java.‡ Plant climbing 3–4 ft., vigorous, with many runners. Leaflets bright green, 2¾–3 in. long, 2–2½ in. broad, quite thick, much wrinkled. Blossoms white. Pods green, 4–6 in. long, ½–9/16 in. broad, subterete, greatly

* Henderson, Cat. (1891).—*Stangenbohne, Triumph Zucker Wachs.* Haage & Sch. Haupt-Verz. (1891).

† Thorburn, Cat. (1893).—*Haricot nain Lyonnais, à très longue cosse.* Vilmorin-And. Cat. (1891).—*Buschbohne, Rillieux.* Haage & Sch. Haupt-Verz. (1891).

‡ *Stangenbohne, Zucker von Java.* Haage & Sch. Haupt-Verz. (1878).

curved; spur slender, curved, $\frac{1}{2}$ in. long. Seed yellowish brown, much darker around the hilum, $\frac{9}{16}$—$\frac{11}{16}$ in. long, $\frac{1}{4}$—$\frac{5}{16}$ in. broad, reniform, somewhat bulged. Moderately productive. — Plate 43, f. 11.

CHOCOLATE.* Plant strictly dwarf, 12–15 in. high. Leaflets light green, $2\frac{1}{2}$–3 in. long, 2–$2\frac{1}{2}$ in. broad, slightly wrinkled. Blossoms pinkish. Pods green, 3–5 in. long, $\frac{3}{8}$—$\frac{1}{2}$ in. broad, $\frac{1}{4}$ in. thick, curved; spur slender, curved, $\frac{1}{4}$—$\frac{3}{8}$ in. long. Seed reddish brown to slate color, $\frac{3}{8}$—$\frac{9}{16}$ in. long, $\frac{1}{4}$—$\frac{5}{16}$ in. broad, $\frac{3}{16}$ in. thick, reniform, usually truncated. An early variety. —Plate 43, f. 12.

CRIMSON FLAGEOLET.† Plant strictly dwarf, 15–18 in. high. Leaflets yellowish green, 4–$4\frac{1}{2}$ in. long, 3–$3\frac{1}{2}$ in. broad, thin, slightly rough, scarcely wrinkled. Blossoms pink. Pods green, 6–7 in. long, $\frac{1}{2}$—$\frac{5}{8}$ in. broad, $\frac{1}{4}$—$\frac{5}{16}$ in. thick, slightly curved; spur slender, a little curved, $\frac{1}{2}$ in. long. Seed reddish brown, $\frac{7}{8}$–1 in. long, $\frac{5}{16}$—$\frac{3}{8}$ in. broad, $\frac{1}{4}$ in. thick, reniform. One of the largest seeded varieties of the common garden bean. —Plate 43, f. 13.

CANADIAN WONDER.‡ Plant strictly dwarf, 15–18 in. high, branchy, exceedingly vigorous. Leaflets deep green, 4–5 in. long, $3\frac{1}{2}$–4 in. broad, quite rough, but not wrinkled. Blossoms white tinged with pink. Pods light or yellowish green, 4–6 in. long, $\frac{1}{2}$—$\frac{5}{8}$ in. broad, $\frac{3}{8}$ in. thick, nearly straight; spur slender, curved, $\frac{1}{2}$—$\frac{3}{4}$ in. long. Seed dark red, $\frac{3}{4}$—$\frac{7}{8}$ in. long, $\frac{5}{16}$—$\frac{7}{16}$ in. broad, $\frac{3}{16}$—$\frac{1}{4}$ in. thick, subreniform, truncated. One of the most productive, and moderately early. —Plate 43, f. 14.

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* Vilmorin-And. Veg. Gard. 47. (1885). — *Haricot chocolat.* Vilmorin-And. Pl. Pot. 254. (1883).

† *Buschbohne, Flageolet blutrothe.* Haage & Sch. Haupt-Verz. (1876).
Philadelphia Commercial Museum, seeds, No. 10499, Buenos Ayres, Argentina.

‡ *Canada Wonder* or *New Rose.* Tillinghast, Cat. (1884).
Phaseolus oblongus carneus Martens, Gartenbohnen 51. (1860.)
Philadelphia Commercial Museum, seeds, No. 10899, Buenos Ayres, Argentina.

VEITCH'S CLIMBING.* Plant climbing 3–4 feet, with few runners. Leaflets light green, $2\frac{1}{2}$–$2\frac{3}{4}$ in. long, $1\frac{3}{4}$–2 in. broad, a little rough, scarcely wrinkled. Blossoms white tinged with pink. Pods green, 4–7 in. long, $\frac{3}{8}$–$\frac{1}{2}$ in. broad, curved, considerably flattened; spur stout, nearly straight, $\frac{1}{4}$ in. long. Seed identical with Canadian Wonder, except smaller in size, and more nearly cylindrical.—Plate 43, f. 15.

RED FLAGEOLET.† Identical with Canadian Wonder except that the pods are yellow.

†† Seed variegated.

IMPROVED FLAGEOLET.‡ Identical with the preceding except that the beans are a bright red and splashed with a yellowish red.—Plate 43, f. 15.

P. MULTIFLORUS Willd.

Phaseolus multiflorus DC. Prodr. **2**: 392. (1825).—Bailey, Cyclop. Am. Hort. **3**: 1294. (1901).
Phaseolus vulgaris multiflorus Nicholson, Gard. Dict.

Plant twining, 10–15 ft. high, minutely pubescent, in warm countries perennial with thick tuberous rootstalks, with us annual and with branchy roots; stem slender. Leaflets broadly ovate or obliquely ovate, acuminate, inclining to triangular, 3–4 in. long, $2\frac{1}{2}$–$3\frac{1}{2}$ in. broad, quite smooth. Blossoms showy, in racemes longer than leaves, white, scarlet, or variegated in different garden varieties. Pods green, oblong, cylindric, varying very much in length, straight or little curved, scabrous, tipped with short stout spur. Seed large, $\frac{3}{4}$–$1\frac{1}{4}$ in. long, $\frac{3}{8}$–$\frac{5}{8}$ in broad, $\frac{1}{4}$–$\frac{3}{8}$ in.

* Veitch, Cat. (1897).

Philadelphia Commercial Museum, seeds, No. 10905, State of Santa Fé, Argentina.

† [Wing], Rept. N. Y. Exp. Sta. **1**: 112. (1882).—*Flageolet Wax.* Thorburn, Cat. (1883).

‡ *Buschbohne, Flageolet Wachs verbesserte.* Haage & Sch. Haupt-Verz. (1897).

thick, a little tumid, variously colored. The cotyledons remain below ground when the seed germinates.

VARIETIES OF P. MULTIFLORUS.

Seed one colored.
  Black. — BLACK RUNNER.
  White.
    Pods 4–5 in. long.
      Seed ½–¾ in. long. — WHITE RUNNER.
      Seed ¾–1¼ in. long. — MAMMOTH.
    Pods 7–9 in. long. — CHELSEA.
Seed variegated.
  Black and reddish brown.
    Pods 4–5 in. long. — SCARLET RUNNER.
    Pods 6–8 in. long. — BEST OF ALL.
  Brown and yellowish; blossoms red and white. — PAINTED LADY.

BLACK RUNNER.* A variety with pure black seed, ¾–⅞ in. long, ½–⅝ in. broad. — Plate 43, f. 17.

WHITE RUNNER.† Plant vigorous. Blossoms white. Pods 4–5 in. long. Seed snow white, ⅝–¾ in. long. — Plate 43, f. 18.

MAMMOTH.‡ Identical with the preceding except that the seed is decidedly larger. — Plate 43, f. 19.

CHELSEA.§ Identical with White Runner except that the pods are 7–9 in. long. — Plate 43, f. 20.

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* *Black-seeded Runner.* Vilmorin-And. Veg. Gard. 71. (1885). — *Haricot d'Espagne à grain noir.* Vilmorin-And. Pl. Pot. 277. (1883). — *Stangenbohne, arabische schwarze.* Haage & Sch. Haupt-Verz. (1870).
Phaseolus multiflorus niger Martens, Gartenbohnen 82. (1860).

† Browne, Rept. U. S. Pat. Off. 338. (1854). — Vilmorin-And. Veg. Gard. 72. (1885). — *Haricot d'Espagne blanc.* Vilmorin-And. Pl. Pot. 277. (1883). — *Stangenbohne, arabische weisse.* Haage & Sch. Haupt-Verz. (1870).
Phaseolus multiflorus β Linn. Sp. Pl. **3**: 1031. [ed. Willd.]. (1800).
Phaseolus multiflorus albus Martens, Gartenbohnen 82. (1860).

‡ *Large white.* Veitch, Cat. (1897).

§ Veitch, l. c. — *Stangenbohne, arabische, Czar.* Haage & Sch. Haupt-Verz. (1895).

Field Columbian Museum, seeds, No. 440: Philadelphia Commercial Museum, seeds belonging to this or the two preceding varieties, No. 3021, "Bab," Hungary; 10873, "Porates cola," Buenos Ayres.

Scarlet Runner.* Blossoms scarlet. Pods 4–5 in. long. Seed with nearly solid black area on each side of the hilum, other portion variegated with black and scarlet. — Plate 43, f. 21.

Best of All.† Identical with the preceding except that the pods are 6–8 in. long. — Plate 43, f. 22.

Painted Lady.‡ Differs from Scarlet Runner only in the blossoms being scarlet and white, and the seeds solid brown on sides of hilum, and yellow, variegated with brown, on other portions. — Plate 43, f. 22 and 24.

DOLICHOS LABLAB L.

Lablab vulgaris DC. Prodr. **2**: 401. (1825). — Nicholson, Gard. Dict.
Dolichos Lablab Bailey, Cyclop. Am. Hort. **1**: 499. (1900).

Plant herbaceous, annual, climbing 10–15 ft. or more, branchy. Leaves trifoliolate; leaflets broadly ovate, cuspidate pointed, the larger ones often broader than long, 3–5 in. long, somewhat wrinkled. Blossoms white or purplish, quite large, in long erect racemes, 2–4 at nodes,

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* Browne, Rept. U. S. Pat. Off. 338. (1854). — [Wing], Rept. N. Y. Exp. Sta. **1**: 115. (1882). — Vilmorin-And. Veg. Gard. 71. (1885). — *Haricot d'Espagne rouge.* Vilmorin-And. Pl. Pot. 276. (1883). — *Stangenbohne, arabische rothblühende.* Haage & Sch. Haupt-Verz. (1870).

Phaseolus coccineus Linn. Sp. Pl. 724. (1753).
Phaseolus vulgaris coccineus Linn. Sp. Pl. 1016. [2 ed.]. (1763).
Phaseolus multiflorus Linn. Sp. **3**: 1030 [ed. Willd.]. (1800).
Phaseolus multiflorus coccineus Martens, Gartenbohnen 83. (1860). — DC. Prodr. **2**: 392. (1825).
Phaseolus Indicus, flore coccinec seu puniceo. Morison, Hist. Oxon. **1**: 69. (1630).
Phaseolus flore coccineo. Raius, Hist. Pl. 884. (1686).
Phaseolus puniceo flore. Tournef. Inst. 414. (1719).

Philadelphia Commercial Museum, seeds, No. 10562, "Frijoles Pilayas de Colorado," Santa Maria de Jesus, Guatemala.

† Veitch, Cat. (1897).

‡ *Painted Lady, Bicolor,* or *York and Lancaster Runner.* Vilmorin-And. Veg. Gard. 71. (1885). — *Haricot d'Espagne bicolore.* Vilmorin-And. Pl. Pot. 277. (1883).
Phaseolus multiflorus bicolor Martens, Gartenbohnen 84. (1860).

borne all along the stems and branches. Pods green or purple in different varieties, pendent, flat, 2–3 in. long, tipped with persistent style. Seed ovate, a little flattened, with broad hilum, the latter situated toward one end, about $\frac{3}{8}$ in. long, $\frac{5}{16}$ in. broad.

BLACK HYACINTH.* Blossoms and pods purplish or violet; seed dark brown to nearly black. — Plate 44, f. 1 and 2.

WHITE HYACINTH.† Blossoms and seeds white, pods green, seed a little smaller than the preceding. — Plate 44, f. 3 and 4.

D. SESQUIPEDALIS L.

Dolichos sesquipedalis Linn. Sp. Pl. 1019. [ed. 2]. (1763). — **3**: 1040. [ed. Willd.]. (1800). — Miller, Gard. Dict. (1807). — DC. Prodr. **2**: 400. (1825). — Nicholson, Gard. Dict. Suppl. (1900). — Bailey, Cyclop. Am. Hort. **1**: 499. (1900).

Plant climbing, twining, or trailing 4–8 ft. Leaflets dark green, ovate, often halberd shaped, 5–6 in. long, 3–4 in. broad. Blossoms whitish, or tinged with purple, solitary or often in twos or threes, borne at end of peduncles. Pods green, terete or nearly so, $1\frac{1}{2}$–2 ft. long, variously twisted. Seed variously colored, small, oblong, with truncated ends. Two varieties are in common cultivation.

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* *Dolichos Lablab* Linn. Sp. Pl. 725. (1753). — **3**: 1037. [ed. Willd.]. (1800). — Miller, Gard. Dict. (1807).

Lablab vulgaris niger, Lablab vulgaris purpureus DC. Prodr. **2**: 401. (1825).

Laplap sive Lablab. Clus. Hist. Stirp. 731. (1583).

Phaseolus Aegyptiacus nigro semine. Bauhin. Pinax 341. (1623).

Phaseolus Lablab Alpini. Raius, Hist. Pl. **1**: 888. (1686).

Phaseolus Aegyptiacus nigro semine seu Lablab Alpini. Weinman. Phyt. **4**: 809. (1745).

Field Columbian Museum, seeds, No. 12102: Philadelphia Commercial Museum, seeds, No. 7311, "Sim."

† *Lablab vulgaris albiflorus* DC. Prodr. **2**: 401. (1825).

Phaseolus Aegyptiacus semine rufo. Bauhin. Pinax 341. (1623).

Field Columbian Museum, seeds, No. 12099: Philadelphia Commercial Museum, seeds, No. 10600.

YARD LONG.* Plants twining or trailing but not climbing. Pods 1½–2 ft. long. The most popular sort. — Plate 44, f. 5.

CUBAN.† Plants climbing 8–10 ft., with a few pods 2–2½ ft. long.

VIGNA CATJANG Walp.

Phaseolus minor Rumphius, Herb. Amb. **5**: 383. [*t. 139. f. 1.*]. (1747).
Dolichos Sinensis Rumphius, Herb. Amb. **5**: 375. [*t. 134*]. (1747). — Linn. Sp. Pl. 1018. (1763). — Loureiro, Fl. Cochin. 436. (1790). — Linn. Sp. Pl. **3**: 1038. (1800). — DC. Prodr. **2**: 399. (1825).
Dolichos Catiang Loureiro, Fl. Cochin. 442. (1790). — Linn. Sp. Pl. **3**: 1051. [ed. Willd.]. (1800). — Miller, Gard. Dict. (1807). — Curtis, Bot. Mag. **48**: [*t. 2232*]. (1821). — DC. Prodr. **2**: 399. (1825).
Vigna Catjang Walp. Linnaea **13**: 533. (1839).

Field Columbian Museum, seeds, No. 1793, 5097, 5106, 11290, 11388, 13225, 13234: Philadelphia Commercial Museum, seeds, No. 1577, "Catiang;" 10576, "Catiang," Japan; 10578, "Frijolitos," Barcelona, State of Bermudez, Venezuela; 10580, "Frijoles ojos negros," Santa Marico Dote, Costa Rica; 10582, Hudavendighiar, Turkey; 10620, "Frijoles," San Diego, State of Bermudez, Venezuela; 10621, "Frijoles bayos," State of Carabobo, Venezuela; 10622, "Frijoles bajos," Venezuela; 10636, "Frijolitos pequeños," State of Carabobo, Venezuela; 10751, "Sasange," Japan; 10764, "Sacace;" 10791, Smyrna, Turkey; 10794, Morocco, Africa; 10831, "Feijão macassar fradinho;" 10832, "Feijão macassar bocca roon," Parahyba, Brazil; 10834, Pernambuco, Brazil; 10835, "Feijão ervilho," Parahyba, Brazil; 10994, Midway, Ala.

Plant an annual, 1½–2 ft. high, diffuse or suberect; stems subterete, glabrous. Leaves on long petioles, trifoliolate; leaflets 3–5 in. long, 2–3 in. broad, ovate-lanceolate, smooth. Flowers white or yellowish white, pink at base of petals, small, in twos or threes, on long peduncles. Pods 4–10 in. long, less than ½ in. thick, subterete,

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* *French Yard Long.* [Wing], Rept. N. Y. Exp. Sta. **1**: 115. (1882).— *Asparagus.* Vilmorin-And. Veg. Gard. 16. (1885). — *Dolique asperge.* Vilmorin-And. Pl. Pot. 280. (1883). — *Stangenbohne, Riesen-Spargel südamerikanische.* Haage & Sch. Haupt-Verz. (1878).

† *Cuban Asparagus.* Vilmorin-And. Veg. Gard. 16. (1885). — *Dolique de Cuba.* Vilmorin-And. Pl. Pot. 281. (1883). — *Stangenbohne, Riesen-Spargel cubanische.* Haage & Sch. Haupt-Verz. (1878).

spreading or pendent. Seed small, usually with truncated ends, variously colored in different varieties, usually with dark area around the hilum.

Many varieties are to be found in cultivation, generally known as cow peas, differing from each other mainly in size and color of seed. These are grown mostly as forage plants. The two following are grown and used in France as a garden esculent to a very limited extent.

MONGETTE.* Plant vigorous, 15–18 in. high, with many runners. Pods 6–8 in. long, $\frac{3}{8}$ in. in diameter. Seed $\frac{3}{8}$–$\frac{1}{2}$ in. long.—Plate 44, f. 11.

TONKIN.† Plant very low, spreading, with few runners $\frac{1}{2}$ ft. in length. Pods 5–7 in. long, $\frac{1}{4}$ in. in diameter. Seed very small, seldom more than $\frac{1}{4}$ in. long.—Plate 44, f. 12.

GLYCINE HISPIDA Maxim.

Phaseolus niger Rumphius, Herb. Amb. **5**: 388. [*t. 140*]. (1747).
Dolichos Soja Linn. Sp. Pl. 727. (1753).—**3**: 1051. [ed. Willd]. (1800).—Miller, Gard. Dict. (1807).
Dolichos Soia Loureiro, Fl. Cochin. 441. (1790).
Soja hispida DC. Prodr. **2**: 396. (1825).
Glycine hispida Maxim. Bull. Acad. Sci. St. Pétersb. **18**: 398. (1873).—Franch. & Sav. Enum. Pl. Jap. **1**: 108. (1875).—Bailey, Cyclop. Am. Hort. **2**: 653. (1900).

Plant an annual, erect, hispid, 1½–2 ft. high or more. Leaves trifoliolate, on medium long petioles; leaflets ciliate, ovate-elliptical, smooth, thin, entire. Flowers small, in short axillary racemes. Pods 1¼–3 in. long, $\frac{5}{8}$ in. broad, constricted between the seeds, short-mucronate, hispid, on short peduncles, 3–4 seeded, pendent. Seed black, brown, yellow, green, or white in different varieties, subglobose, $\frac{1}{4}$ in. thick, pea-like, smooth.

There are many varieties, differing mainly in color of

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* *Black-eyed Bird's Foot.* Vilmorin-And. Veg. Gard. 74. (1885).—*Dolique Mongette, Banette, Haricot Cornille.* Vilmorin-And. Cat. (1891).

† *Dolique du Tonkin.* Vilmorin-And. Cat. (1891).

seeds, which have been in cultivation for centuries in China and Japan where they are extensively used as human food in soups and as a substitute for coffee. It was unknown in this country until twenty-five years ago, since which time it has been grown much as a forage plant.—Plate 46.

YELLOW SOY.* Plant 12–18 in. high, compact. Leaflets large, 5–5½ in long, 4–4½ in. broad, yellowish green. Blossoms small, pinkish. Pods 1½–2 in. long, ½ in. broad, slightly curved, flattened a little. Seed ovate or nearly spherical, ¼ in. long, yellowish brown around the hilum.—Plate 44, f. 6 and 7.

BLACK SOY.† Plant 10–15 in. high. Leaflets medium, 3½–4 in. long, 2½–3 in. broad. Pods 2 in. long, ½ in. broad, flattened a little. Seed black, same size as Yellow Soy but more flattened.—Plate 44, f. 8.

GREEN SOY.‡ Identical with Yellow Soy, except a tinge of green on the seed.—Plate 44, f. 9.

BROWN SOY. Identical with preceding except seed dark brown.

ÉTAMPES SOY. Plant usually more than 2 ft. in height. Seed $\frac{3}{16}$–$\frac{3}{8}$ in. long. Very productive and early, otherwise the same as Yellow Soy.—Plate 44, f. 10.

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* Seed of this and the following varieties from Haage & Schmidt.

Field Columbian Museum, seeds, No. 438, 1098, 1794, 1795, 5104: Philadelphia Commercial Museum, seeds, No. 948, "Sasage," Japan; 7742, "Itachi," Agricultural Bureau, Japan; 10470, Kazan, Russia; 10572, Japan; 10573, Japan; 10574, "Waa Tai," Siam; 10757, "Daidzu," Mujage Agric. School, Japan; 10758, "Daidzu," Iwate Agric. Institute, Japan; 10760, "Daidzu," Japan; 10765, "Barak," Japan; 10768, "Lau Lao Peas," Siam; 10771, "Pea Bean," Corea; 10932, Floyd Co., Ga. 10937, "Weevil Proof Peas (Beans)," Polk Co., Ga.

† Field Columbian Museum, seeds, No. 1095, 1790: Philadelphia Commercial Museum, seeds, No. 10752, "Kuro mame," Japan; 10753, "Daidzu," Osaka Agric. School, Japan; 10769, Corea.

‡ Field Columbian Museum, seeds, No. 1791: Philadelphia Commercial Museum, seeds, No. 7743, "Awo-daidzu," Yamacata, Japan; 10756, "Daidzu," Iwate Agric. Institute, Japan; 10759, Japan; 10761, "Tia haku mame," Japan.

VICIA FABA L.

Faba vulgaris Tragus, Stirp. 617, 618. (1552).— DC. Prodr. **2**: 354. (1825).
Vicia Faba Linn. Sp. Pl. 737. (1753). — Thunb. Fl. Jap. 284. (1784).— Loureiro, Fl. Cochin. 443. (1790). — 540. [ed. Willd.]. (1793). — Linn. Sp. Pl. **3**: 1111. [ed. Willd.]. (1800). — Nicholson, Gard. Dict.
Faba. Fuchs. Pl. Hist. 388, 389. (1578). — Bauhin. Pinax 338. (1623). — Raius, Hist. Pl. **1**: 909. (1668). — Tournef. Inst. 391. [*t. 212.*]. (1719). — Miller, Gard. Dict. (1731).
Phaseolus sativus. Dodoens, Hist. Pl. 472. [Lyte Transl.]. (1578).
Faba major hortensis. Gerarde, Herb. 1036. (1597).
Faba graeca. Matth. Opera 326. (1598).
Bona seu Phaseolus major. Dodoens, Stirp. Hist. Pempt. 513. (1616).
Faba compressa major, seu hortensis recentiorum alba & rubra. Morison, Hist. Oxon. **2**: 85. (1680).
Faba major or major hortensis. Blackwell, Herb. **1**: [*t. 19*]. (1737).
Faba major. Weinman. Phyt. Ic. **2**: 435. [*t. 500*]. (1739).

Plant an annual; stem quadrangular, striate, 1–5 ft. high, few branched, often blotched with dark purple. Leaves rather crowded along the stem and branches; leaflets 3–6, ovate, oblong or elliptical, mucronate, 2–3 in. long, 1–1½ in. broad, smooth, glabrous or slightly tomentose, nearly sessile. Flowers axillary, clustered, white, blotched with dark purple and red, in one variety white. Pods nearly erect or often curved or bent by their own weight, 3–7 in. long, ⅜–½ in. thick, woolly within. Seed variable, flattened to oblong. — Plate 47.

Varieties of Vicia Faba.

Seed small, ⅜–7/16 in. long, ¼–⅜ in. wide, nearly as thick; stem 3–5 ft. high. Specimens of the July bean no larger than these often occur. **Horse.**
Seed a little larger, ½–¾ in. long, 7/16–½ in. broad, much flattened; plants dwarf, 1–5 ft. high.
Mature pods erect or spreading. **Small Pods.**
Plants very dwarf, 12–15 in. high.
Fresh ripe seed without greenish tinge. **Fan.**
Fresh ripe seed with greenish tinge. **Gem.**
Plants taller than last.
Fresh ripe seed dark red. **July.**
Greenish red. **Green July.**
Light or whitish red. **Early Mazagan.**
Purplish or violet. **Violet.**

Mature pods pendent or drooping.
Seed about equal in length and breadth; pods short, seldom more than 4 in. long. BROAD PODS.
Seed bright red. WINDSOR.
With greenish tinge. GREEN WINDSOR.
Light red or white. WHITE WINDSOR.
Seed decidedly longer than broad; pods 5–10 in. or more in length. LONG PODS.
Seed purplish. SICILIAN.
Seed not purple.
Plants about 2 ft. high.
Pods 8–10 in. long. SEVILLE.
Pods 12–14 in. long. AGUA DULCE.
Plants 3–5 ft. high; blossoms purplish.
Seed red. LONG POD.
Seed with greenish tinge. GREEN LONG POD.

HORSE.* Stem 3–5 ft. high, quite erect and stiff. Leaflets rather broad and dark green. Pods erect or pendent on the same plant, 4–5 in. long, $\frac{5}{8}$–$\frac{7}{8}$ in. broad, containing 4–5 beans. Several varieties have been recorded, differing in hardiness and size of plant and seed, some being sufficiently hardy to plant in autumn. Grown in Europe as a field crop for stock food. This variety is not used as a table vegetable. — Plate 44, f. 13.

a. Small pods.

FAN.† Plant about a foot high, 2–3 branched from near

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* Burr, Field & Gard. Veg. 507. (1863). — *Scotch Bean.* Fide Burr, l. c. — *Horse-Bean* or *Small Field Bean.* Vilmorin-And. Veg. Gard. 28. (1885). — *Feveroles.* Vilmorin-And. Pl. Pot. 217. (1883).

Vicia Faba equina Loudon, Cyclop. Pl. 622. (1866).
Faba vulgaris equina Vilmorin-And. Pl. Pot. 217. (1883).
The lesser beane. Dodoens, Hist. Pl. [Lyte Transl.] 472. (1578).
Faselo minore. Dodoens, Stirp. Hist. Pempt. 515. (1616).
Faba minor sive equina. Bauhin. Pinax 338. (1623). — Raius, Pl. Hist. 1: 909. (1686).
Faba rotunda oblonga seu cylindrica minor, seu equina alba & nigra. Morison, Hist. Oxon. 2: 85. (1680).
Faba minor seu Equina. Weinman. Phyt. Ic. 2: 435. [*t. 500*]. (1739).
Field Columbian Museum, seeds, No. 436.

† *Dwarf Fan.* Gard. Chron. **1850**: 84.— *Dwarf Fan* or *Cluster.* Burr, Field & Gard. Veg. 505. (1863). — *Early Dwarf, Bog-bean.* Fide

the ground. Stem brownish red or copper colored. Leaves arranged along each side of the stem like a fan; leaflets small, 1–2½ in. long, ⅝–⅞ in. broad. Pods erect, in twos or threes, subterete, 2–3 in. long, ⅝–¾ in. thick, containing 3–4 beans. Seed oblong to squarish, a little flattened, dented on sides, ½–⅝ in. long, 7/16–½ in. broad. Very early and productive.— Plate 44, f. 14.

GEM.* Identical with the preceding except that the plants are more compact, hardly as tall, pods a little smaller, and seed reddish or yellowish green.— Plate 44, f. 15.

JULY.† Plants 2–3 ft. high, with stout branchy stem. Leaflets grayish green, 1¾–2 in. long, ⅞–1 in. broad. Blossoms 4–6 in a cluster. Pods erect, often in clusters of three or four, terete or nearly so, 3–4½ in. long, ½–⅝ in. hick. Seed reddish or yellowish brown, ⅝–7/16 in. long, ½–⅝ in. broad. — Plate 44, f. 16.

GREEN JULY.‡ Identical with the preceding except in color of fresh ripe seed which is reddish green.

EARLY MAZAGAN.§ Plant 2–3 ft. high, with slender stems. Leaflets about 2 in. long and 1 in. broad. Pods upright or spreading, in clusters of two or three, 4–5 in. long, ⅝–¾ in. thick, slightly flattened. Fresh ripe seed light red to nearly

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Burr, l. c. — Vilmorin-And. Veg. Gard. 27. (1885). — Miller, Gard. Dict. (1807). — *Fève naine hâtive à Chassis*. Vilmorin-And. Pl. Pot. 216. (1883). — *Puffbohne Fächer* oder *Büschel*. Haage & Sch. Haupt-Verz. (1876).

* *Beck's Dwarf Green Gem*. Vilmorin-And. Veg. Gard. 28. (1885). — *Fève naine verte de Beck*. Vilmorin-And. Pl. Pot. 217. (1883).

† *Small July*. Vilmorin-And. Veg. Gard. 27. (1885). — *Fève Julienne verte*. Vilmorin-And. Pl. Pot. 215. (1883).

‡ *Green Julienne*. Burr, Field & Gard. Veg. 507. (1863). — *Small Green July*. Vilmorin-And. Veg. Gard. 26. (1885). — *Fève Julienne*. Vilmorin-And. Pl. Pot. 215. (1883).

§ McIntosh, Book of Gard. 67. (1855).— Burr, Field & Gard. Veg. 506. (1863). — Vilmorin-And. Veg. Gard. 27. (1885). — Miller, Gard. Dict. (1807). — *Early Malta, Early Aldridge, Stidolphis, Early Bromley*. Fide McIntosh, l. c. — *Fève de Mazagan*. Vilmorin-And. Pl. Pot. 216. (1883).

white, a little larger than July. A very hardy variety but on account of the weak stems requires support if the plants are to be kept from the ground. Originally came from a Portuguese settlement on the northwest coast of Africa near the Strait of Gibraltar. Introduced into England the early part of the 18th century and was catalogued in America the early part of last century. — Plate 44, f. 17.

VIOLET.* A strain of the preceding with violet colored seeds.

aa. Broad pods.

WINDSOR.† Plant 3–4 ft. high. Stem erect, stout, tinged with reddish brown. Leaflets 2–3 in. long, 1–1½ in. broad. Blossoms medium sized, white, marked with dark brown and black, 4–6 in a cluster. Pods erect at first, soon becoming pendent or drooping, solitary or in twos, 3–5 in. long, 1–1¼ in. broad, largest toward one end, containing 2–3 seeds. Seed irregularly round or a little elongated, ¾–1 in. across, very flat, reddish yellow or reddish brown. A very old, rather late, and fairly productive variety. — Plate 44, f. 18.

JOHNSON'S WONDERFUL.‡ An improved form of the preceding with slightly longer pods, and a little more productive.

GREEN WINDSOR.§ Identical with Windsor except that

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* *Violet or Purple.* Burr, Field & Gard. Veg. 510. (1863). — *Purple.* Vilmorin-And. Veg. Gard. 27. (1885). — *Fève violette.* Vilmorin-And. Pl. Pot. 216. (1883).

† Miller, Gard. Dict. (1807). — Gard. Chron. **1850**: 84. — McIntosh, Book of Gard. 67. (1866). — *Red Windsor.* Burr, Field & Gard. Veg. 509. (1863). — *Broad Windsor.* Vilmorin-And. Veg. Gard. 24. (1885). — *Fève de Windsor.* Vilmorin-And. Pl. Pot. 212. (1883). — *Puffbohne, Windsor grosse rothe.* Haage & Sch. Haupt-Verz. (1890).

‡ Burr, Field & Gard. Veg. 508. (1863).

§ Gard. Chron. **1850**: 84. — Burr, Field & Gard. Veg. 507. (1863). — McIntosh, Book of Gard. 67. (1866). — Vilmorin-And. Veg. Gard. 25. (1885). — *Fève de Windsor verte.* Vilmorin-And. Pl. Pot. 213. (1883). — *Puffbohne, Windsor grosse grüne.* Haage & Sch. Haupt-Verz. (1876).

the seeds are a little thicker and have a decided greenish tinge. — Plate 44, f. 19.

WHITE WINDSOR.* Identical with the preceding, except that the seeds are white or light yellow.

aaa. Long pods.

SICILIAN.† Stem quite erect, 2–2½ ft. high, usually tinged with red. Pods often in twos or threes, 5–6 in. long, 1 in. broad, containing 2–3 beans. Seed flat, elongated, ¾–1 in. long, ½–¾ in. broad, very dark red or purplish colored. Moderately productive. — Plate 44, f. 20.

SEVILLE.‡ Plants about 2 ft. high. Leaflets rather large, 2–3 in. long, 1–1½ in. broad, ovate-elliptical, light green. Blossoms usually 2–4 in a cluster, white or with very slight trace of violet. Pods pendent, solitary or in twos, 8–10 in. long, ⅜–½ in. broad, terete or slightly flattened. Seed irregularly elongated, ⅞–1 in. long, ¾–⅞ in. broad, reddish brown. — Plate 44, f. 21.

AGUA DULCE.§ Identical with the preceding except that the pods are 12–15 in. long, 1–1¼ in. broad. Each plant seldom bears more than a few well developed pods.

LONG POD.‖ Plant 3–4 ft. high. Pods 6–7 in. long,

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* *Windsor.* Burr, Field & Gard. Veg. 511. (1863). — *Puffbohne, Windsor grösste weisse.* Haage & Sch. Haupt-Verz. (1876).

Museum seeds according to seed characters only, evidently belonging to the broad pod group: — Field Columbian Museum, No. 15952: Philadelphia Commercial Museum, No. 3010, Hungary; 10734, "Habas," Lerma, State of Mexico, Mexico; 10740, "Haba amarilla," Mexico.

† *The Purple Sicilian Bean.* Vilmorin-And. Veg. Gard. 27. (1885).

‡ *Seville Long Pod.* Vilmorin-And. Veg. Gard. 25. (1885).

§ *Agua Dulce Long Pod.* Vilmorin-And. Veg. Gard. 25. (1885). — *Leviathan.* Veitch, Cat. (1897).

‖ Miller, Gard. Dict. (1807). — *Long-podded.* Burr, Field & Gard. Veg. 508. (1863). — Gard. Chron. **1850**: 84. — McIntosh, Book of Gard. 67. (1855). — *Lisbon, Hang-down, Sandwich, Turkey Long Pod.* Fide Burr, l. c.; McIntosh, l. c.; Miller, l. c. — *Sword Long Pod.* Thorburn, Cat. (1883). — *Improved Long Pod.* Veitch, Cat. (1897). — *Puffbohne, englische lange hangeschotige.* Haage & Sch. Haupt-Verz. (1876).

1–1¼ in. broad, containing 3–4 beans. Seed ⅞–1 in. long, ⅝–⅞ in. broad, bright reddish brown, flat. — Plate 44, f. 22.

Green Long Pod.* Identical with the preceding except that the seeds have a distinct greenish tinge.

EXPLANATION OF PLATES.

The plates were drawn by Mrs. M. H. D. Irish under supervision of the author. In the photographs of seeds each variety is represented by two specimens, one showing a side and the other the raphal view. The figures are numbered from the left beginning with the upper row in each plate. The drawings are reduced one-half except where otherwise stated and the photographs are of natural size.

Plate 38. — 1, Carolina; 2, Willow Leaf; 3, Black Lima; 4, Jackson; 5, Large White; 6, Ford; 7, Burpee; 8, Speckled; 9, Dreer; 10, Kumerle; 11, Rice; 12, Dwarf Rice; 13, Prédome; 14, Dwarf Prédome; 15, Princess; 16, Sugar; 17, Navy; 18, Indian Chief; 19, Queen; 20, Black Wax; 21, White Algerian; 22, White Wax.

Plate 39. — 1, Marrow; 2, Sophie; 3, Mont d'Or; 4, Dwarf Mont d'Or; 5, Cherry; 6, Yellow Princess; 7, Yellow Canada; 8, Six Weeks; 9, Golden Cranberry; 10, Zebra; 11, Horticultural; 12, Spotted Wax; 13, Horticultural Wax; 14, Corn Bean; 15, Golden Wax; 16, Intestin; 17,

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* Miller, Gard. Dict. (1807). — Gard. Chron. **1850**: 84. — McIntosh, Book of Gard. 67. (1855). — *Green Nonpareil, Green Genoa.* Fide McIntosh, l. c.

Museum seeds according to seed characters only evidently belonging to the long pod group: — Field Columbian Museum, No. 12101, 15958, 16506, 16507, 16508: Philadelphia Commercial Museum, No. 3020, Hungary; 6063, "Habas chicas," Chili; 10463, Konya, Turkey; 10465, Buenos Ayres, Argentina; 10466, "Habones," Villabonga Tarragona, Spain; 10467, "Habas Aostadas," Guatemala; 10731, "Habas," Federal District, Mexico; 10732, "Haba Peruana," Hatcala, Mexico; 10733, "Habas," Haxcala, Mexico; 10735, "Haba amarilla," Haxcala, Mexico; 10737, "Habas," Tenancingo, State of Mexico, Mexico; 10738, "Habas," Guadelupe Hidalgo, Federal District, Mexico; 10739, "Haba," Tlalnepantla, Mexico; 10842, Buenos Ayres, Argentina; 10946, Spain; 10955, 10956, "Habas," Quezaltenango, Guatemala; 10957, Guatemala.

White Valentine; 18, White Asparagus; 19, Edible Pod; 20, Long Princess; 21, Early Negro; 22, Currie; 23, Cylinder; 24, Yosemite.

Plate 40.— 1, Orleans; 2, Southern Prolific; 3, Hundredfold; 4, Barbes; 5, Digoin; 6, White Pod; 7, Rob Roy; 8, Russian; 9, Sir Joseph Paxton; 10, Brown Holland; 11, Stringless; 12, Refugee; 13, Osborn; 14, Warwick; 15, Sion House; 16, Hinrich; 17, Improved Hinrich; 18, Bicolor; 19, Detroit; 20, Early China; 21, Keeney; 22, Rachel; 23, White Swiss; 24, White Kidney.

Plate 41. — 1, Maine; 2, Davis; 3, White Flageolet; 4, Long Flageolet; 5, Étampes; 6, Krumschnabel; 7, Long Negro; 8, Kentucky Wonder; 9, Cream; 10, Ne Plus Ultra; 11, Dun; 12, Long Yellow; 13, Wardwell; 14, Matchless; 15, Bulgarian; 16, Marvel; 17, Nettle Leaved Bagnolet; 18, Pride of Lyon; 19, Black Speckled; 20, Mohawk; 21, Ilsenburger; 22, Valentine; 23, Williams; 24, Blood Speckled.

Plate 42. — 1, July; 2, Augusta; 3, Princess Bismarck; 4, Golden Cluster; 5, Case Knife; 6, Wax Case Knife; 7, Inexhaustible; 8, Dwarf Case Knife; 9, Unique; 10, Soissons; 11, Dwarf Soissons; 12, Green Soissons; 13, Smyth's Hybrid; 14, Turtle Soup; 15, Black Similtar; 16, White Zulu; 17, Chartres; 18, Emperor; 19, Willmot; 20, Japan; 21, Red Soissons; 22, Purple Pod; 23, Superb; 24, Thüringen.

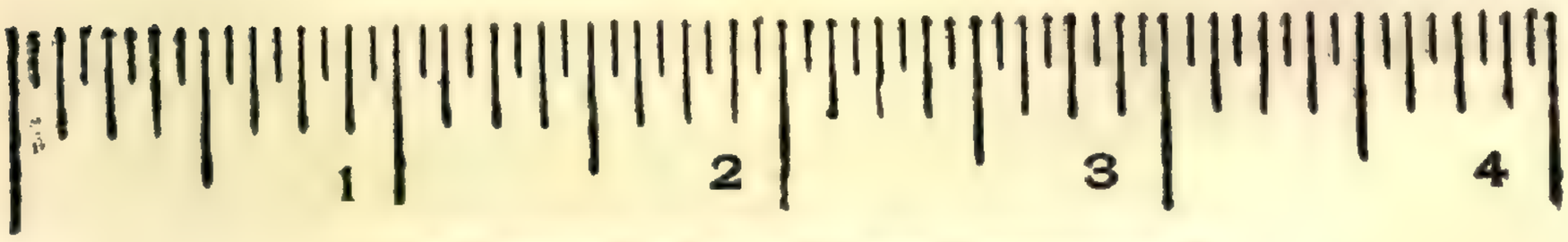
Plate 43. — 1, Forty Days; 2, Fejee; 3, Reine; 4, Marbled Sword; 5, Nettle Leaved Canterbury; 6, White Lyonnaise; 7, Triumph; 8, American Wax; 9, Golden Champion; 10, Lyonnaise; 11, Java; 12, Chocolate; 13, Crimson Flageolet; 14, Canadian Wonder; 15, Veitch's Climbing; 16, Improved Flageolet; 17, Black Runner; 18, White Runner; 19, Mammoth; 20, Chelsea; 21, Scarlet Runner; 22, Best of All; 23 and 24, Painted Lady.

Plate 44. — 1 and 2, Black Hyacinth; 3 and 4, White Hyacinth; 5, Yard Long; 6 and 7, Yellow Soy; 8, Black Soy; 9, Green Soy; 10, Étampes Soy; 11, Mongette; 12, Tonkin; 13, Horse; 14, Fan; 15, Gem; 16, July; 17, Early Mazagan; 18, Windsor; 19, Green Windsor; 20, Sicilian; 21, Seville; 22, Long Pod.

Plate 45. — 1, *Phaseolus vulgaris*, × ½; 2, *Phaseolus multiflorus*, × ¼.

Plate 46. — *Glycine hispida*, × ½.

Plate 47. — *Vicia Faba*, × ½.



FOUR INCHES, DIVIDED INTO SIXTEENTHS.

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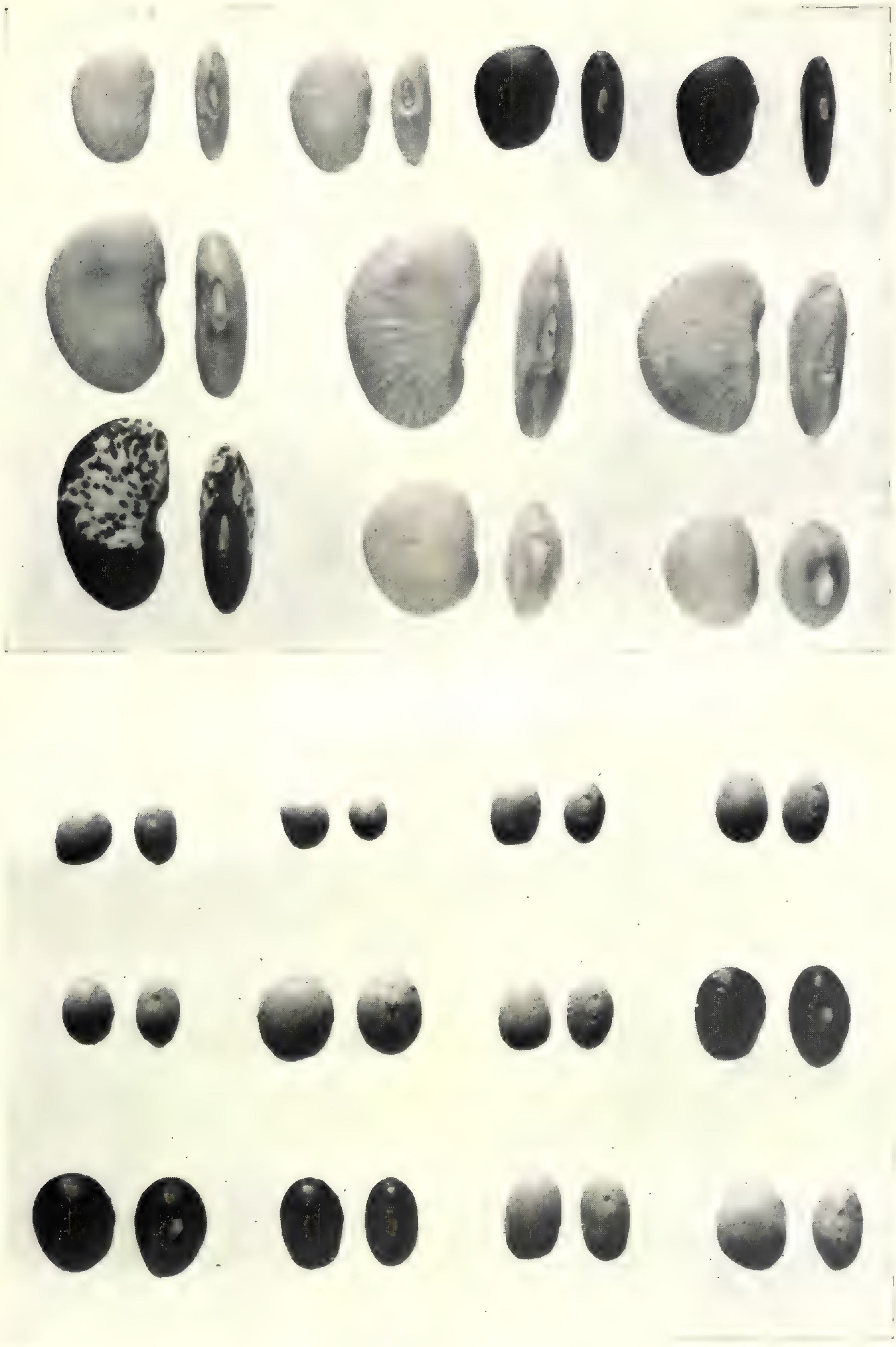

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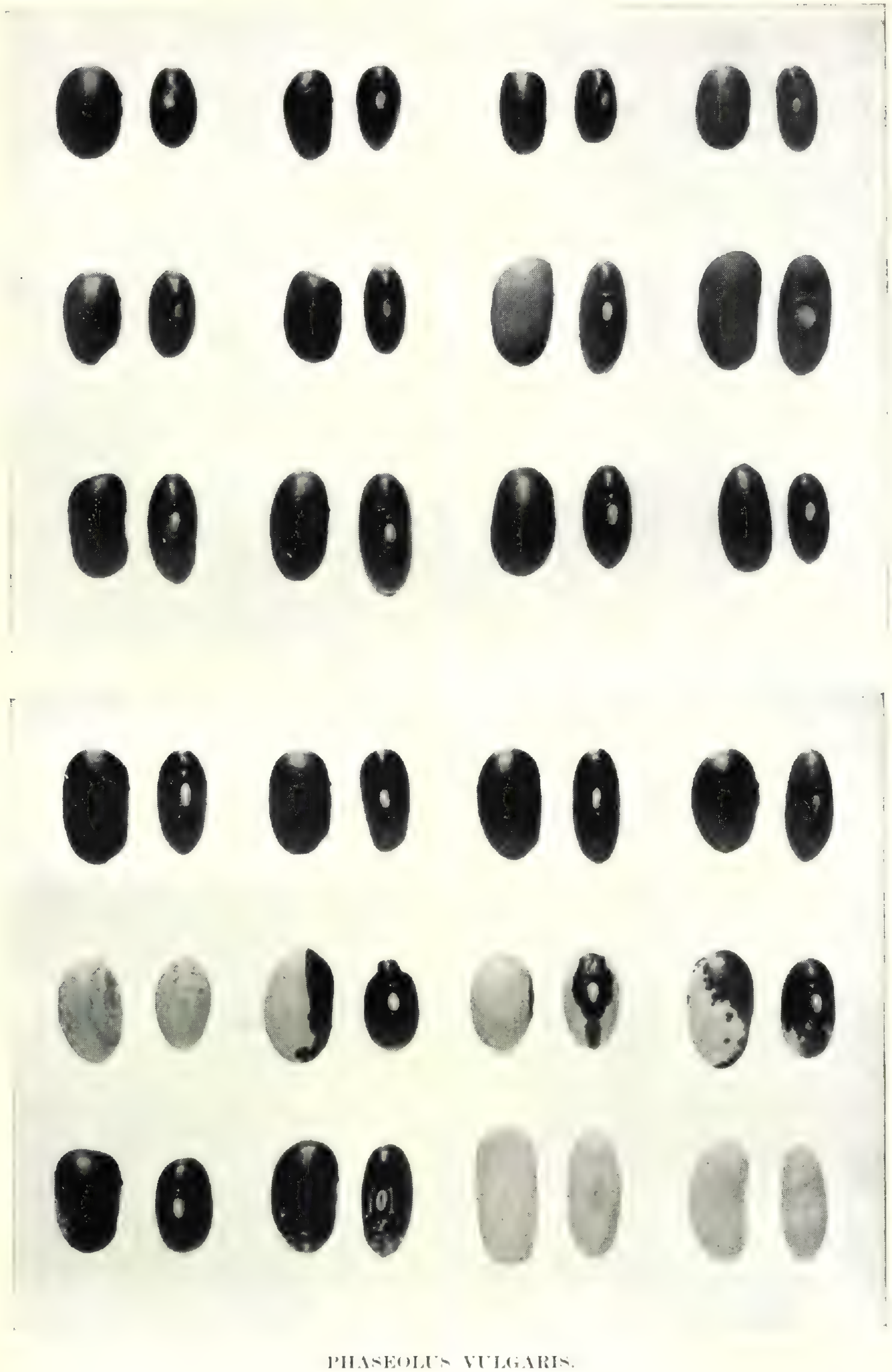

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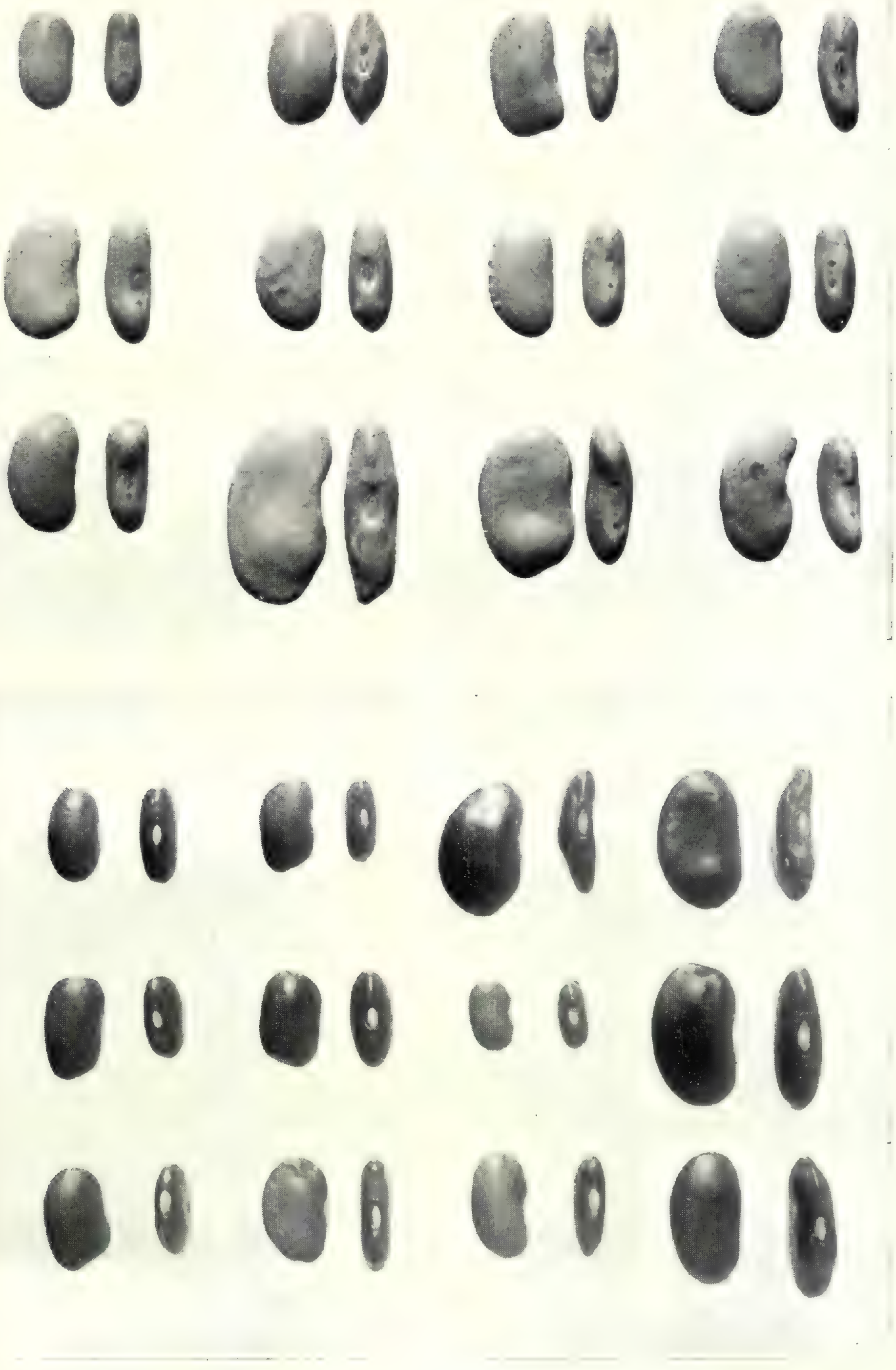

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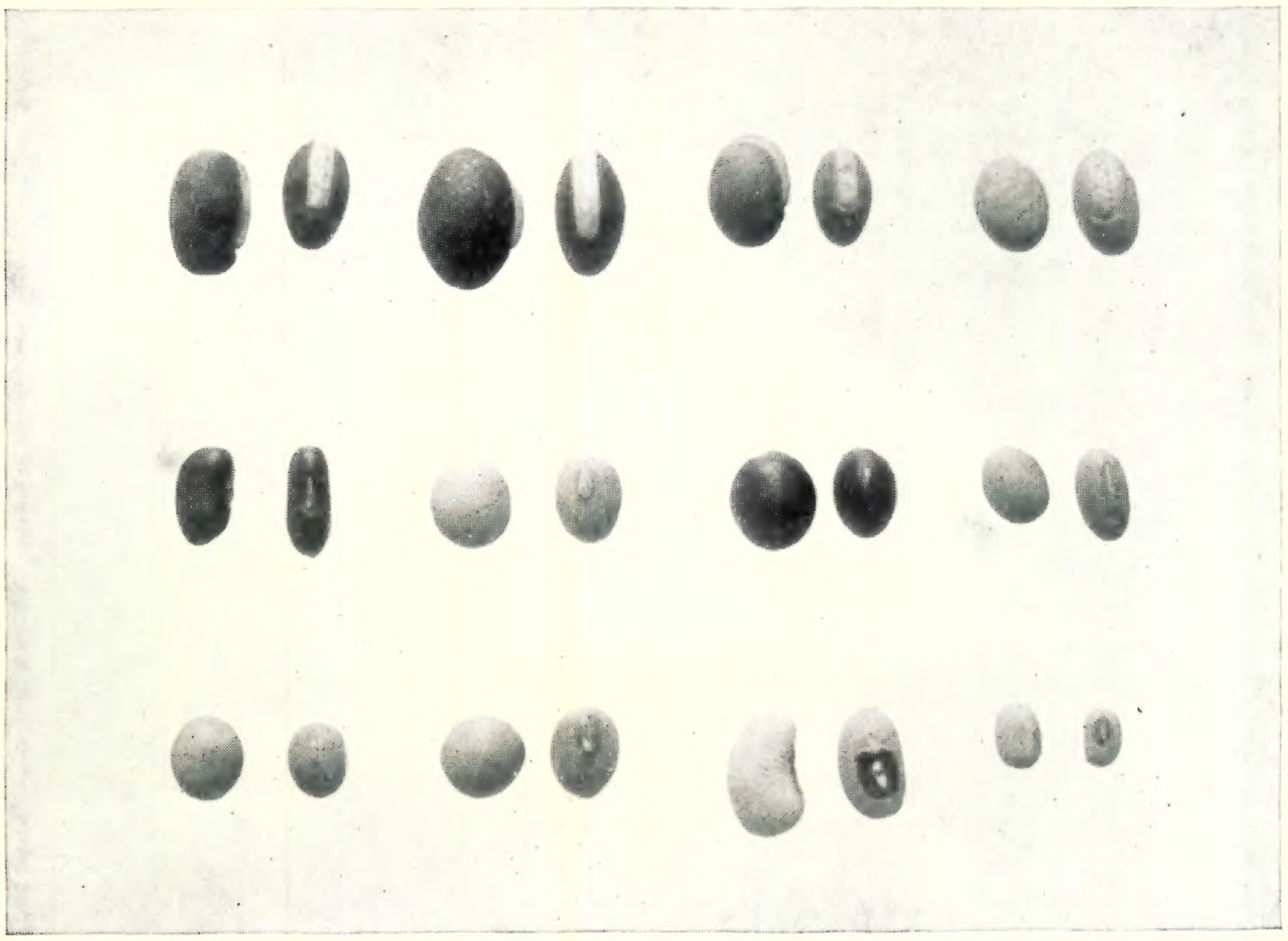

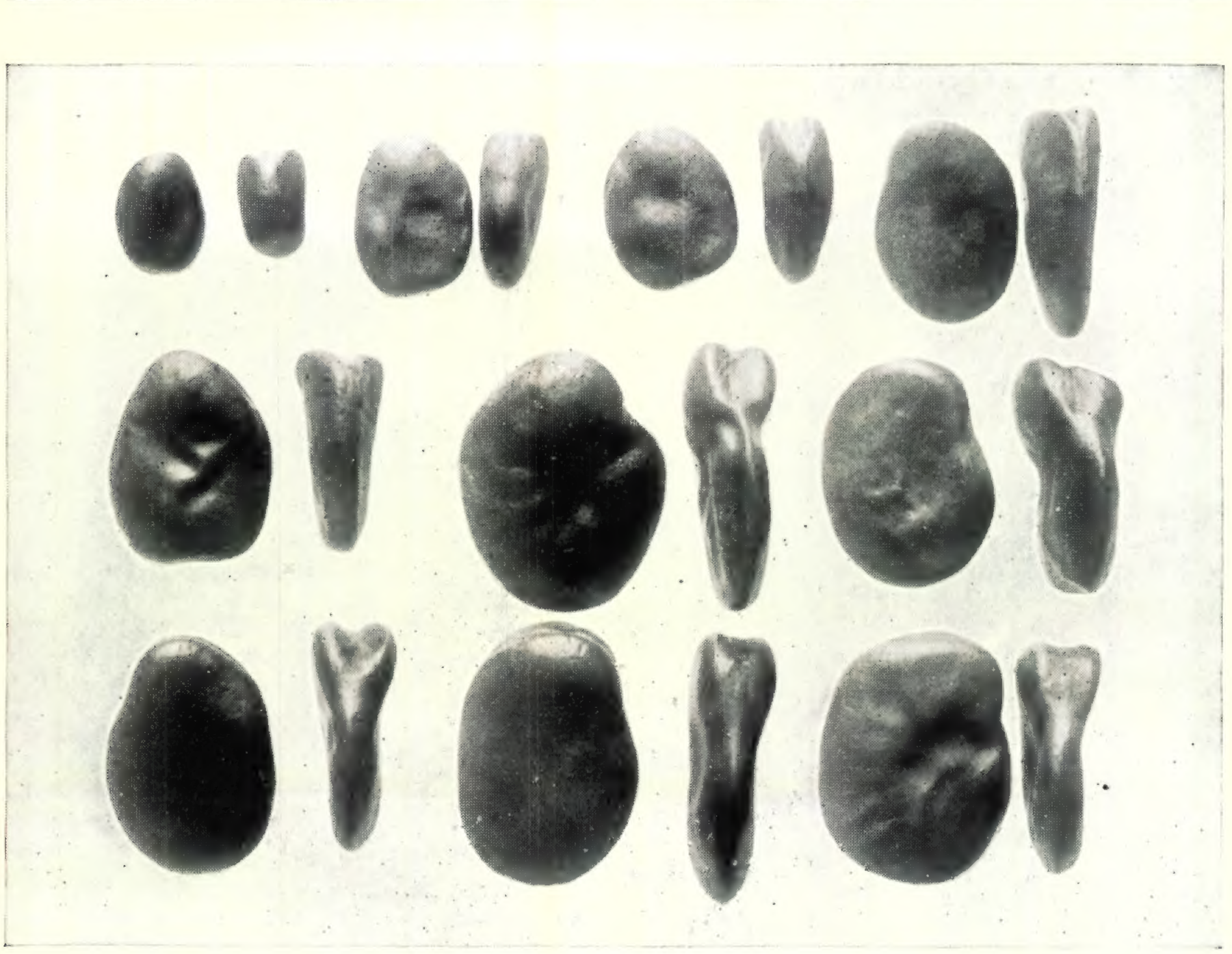

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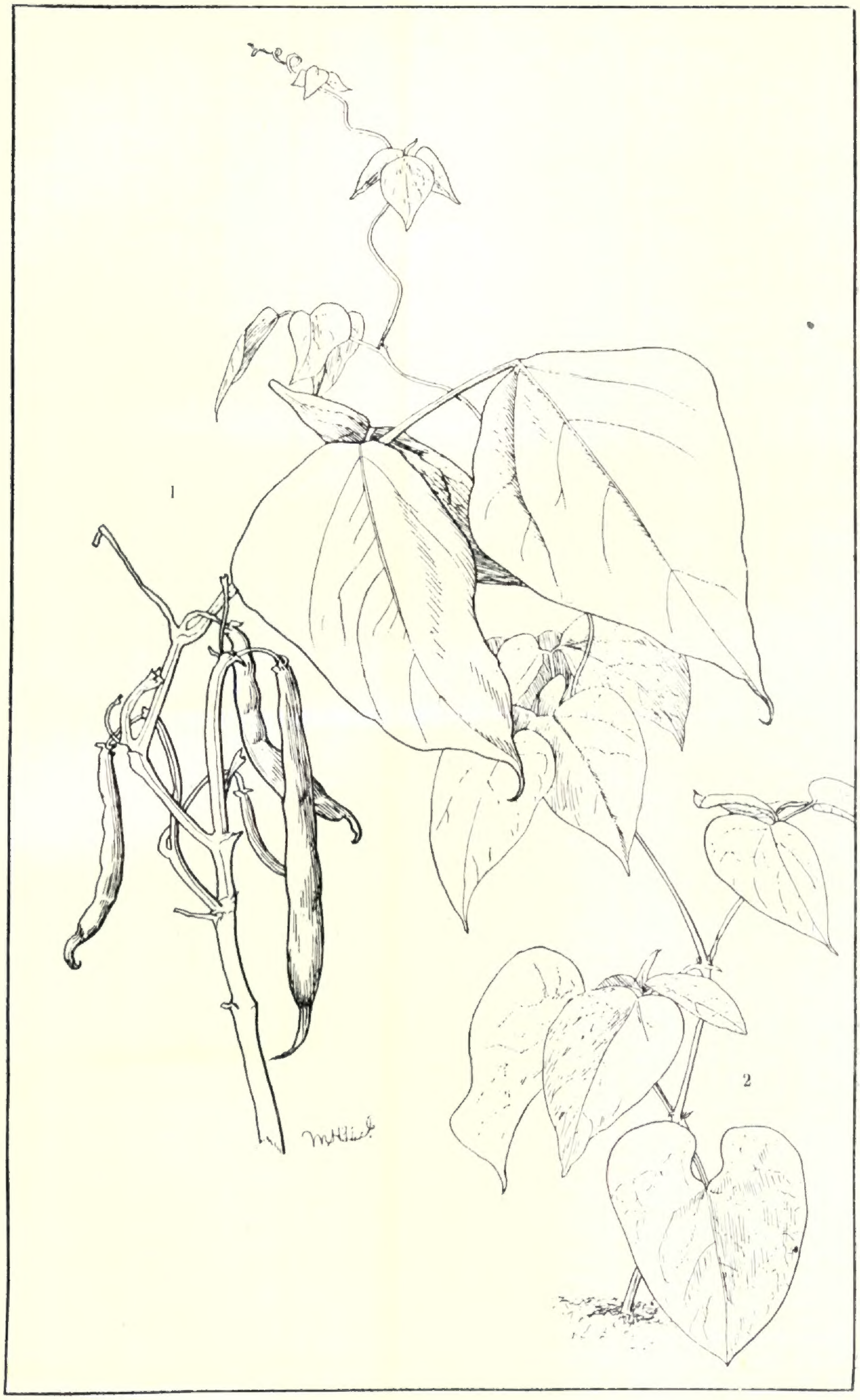

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